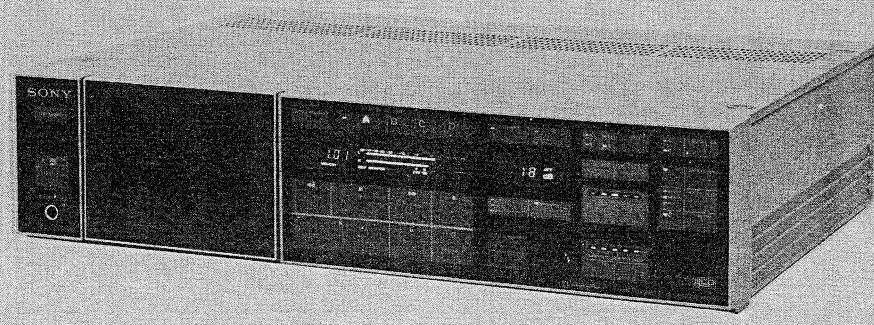
TC-FX101U

US Model
Canadian Model
AEP Model
UK Model
E Model



"Dolby" and the double-D symbol are the trade marks of Dolby Laboratories Licensing Corporation. Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.

STEREO CASSETTE DECK

SPECIFICATIONS

Recording system 4-track 2-channel stereo
Fast-forward and rewind time
Approx. 80 sec. (with C-60 cassette)
Bias frequency 105 kHz
Signal-to-noise ratio (NAB, at peak level)

Cassette / Dolby NR key	OFF	B-TYPE ON	C-TYPE ON
TYPE IV (Sony METALLIC)	60 dB	67 dB	73 dB
TYPE III (Sony FeCr)	61 dB	68 dB	74 dB
TYPE II (Sony CD-α)	57 dB	64 dB	70 dB
TYPE I (Sony BHF)	56 dB	63 dB	69 dB

Total harmonic distortion
0.8% (with Sony METALLIC and FeCr cassettes)
Frequency response DOLBY NR OFF
- With TYPE IV cassette (Sony METALLIC)
  20 - 20,000 Hz
  25 - 18,000 Hz (±3 dB)
  25 - 13,000 Hz (±3 dB, 0 VU recording)
  25 - 18,000 Hz (DIN)
- With TYPE III cassette (Sony FeCr)
  20 - 20,000 Hz
  25 - 18,000 Hz (±3 dB)
  25 - 18,000 Hz (DIN)
- With TYPE II cassette (Sony CD-α)
  20 - 19,000 Hz
  25 - 17,000 Hz (±3 dB)
  25 - 17,000 Hz (DIN)
- With TYPE I cassette (Sony BHF)
  20 - 18,000 Hz
  25 - 16,000 Hz (DIN)

Wow and flutter 0.04% WRMS (NAB)
±0.12% (DIN)

— Continued on page 2 —

Tape Transport Mechanism Type	TCM-110C1

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

MICROFILM

SONY®

SERVICE MANUAL

TC-FX1010

Inputs	Line inputs (phono jacks) Sensitivity 77.5 mV (–20 dB) Input impedance 50 k ohms
Outputs	Line outputs (phono jacks) Maximum output level 0.435 V (–5 dB) at a load impedance of 50 k ohms with LINE OUT level control at "0" Variable in sixteen steps from –5 dB to –35 dB Load impedance over 10 k ohms Headphone output Output level variable in sixteen steps from –20 dB to –50 dB at a load impedance of 8 ohms

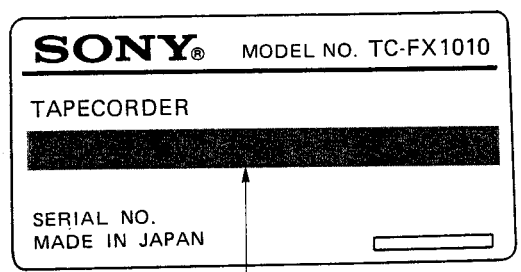
General

Power requirements	US, Canadian model: 120 V ac, 60 Hz AEP model: 220 V ac, 50/60 Hz (240 V ac adjustable by authorized Sony personnel) UK model: 240 V ac, 50/60 Hz (220 V ac adjustable by authorized Sony personnel) E model: 110, 120, 220 or 240 V ac adjustable 50/60 Hz
Power consumption	US, Canadian model: 40 W AEP, UK model: 38 W E model: 49 W
Dimensions	Approx. 430 x 105 x 330 mm (w/h/d) (17 x 4¼ x 13 inches) including projecting parts and controls
Weight	Approx. 8.1 kg (17 lbs 14 oz)

0 dB = 0.775 V

MODEL IDENTIFICATION

– Specification Label –



US, Canadian model . . .	AC: 120V	60Hz	40W
AEP model . . .	AC: 220V	50/60Hz	38W
UK model . . .	AC: 240V	50/60Hz	38W
E model . . .	AC: 110, 120, 220, 240V	50/60Hz	49W

TABLE OF CONTENTS

NOTES ON REPAIR

The microcomputer in this set operates off the T702 voltage supply even when the POWER switch on the panel is OFF, when connected to AC power supply.
Further, even when the AC power supply is disconnected, the back-up battery provides MEMORY maintenance (stand-by mode).
Please observe the following precautions:

1. DO NOT short the pattern, etc. even when the POWER switch is OFF if the AC plug is connected to AC power supply.
2. When replacing ICs and other parts, BE SURE to disconnect the AC plug and back-up battery lead wire (connector).
   When power is cut by disconnecting the back-up battery, STATUS MEMORY content is erased, and initial state results.
3. When replacing the head base solenoid, read the section on head base position adjustment before removing the old solenoid.

Handling Precautions for MOS ICs

Generally, the insulation resistance of the oxide layer in MOS IC structures is very high, and the oxide layer is very thin. Because of this, it is possible that the static voltages usually present on clothes and the human body will be enough to generate a potential difference across the insulator, high enough to cause a breakdown of the insulating layer.

The following precautions should be taken while handling these ICs.

(Particular care should be taken under conditions of low humidity.)

Precautions in Replacing MOS ICs

1. Store new ICs by inserting them into a urethane-polyester cushion (which is somewhat conductive), or wrapping it in aluminum foil, so that all the pins are at the same potential.
   (The ICs should be stored in that manner until mounted on the circuit board.)

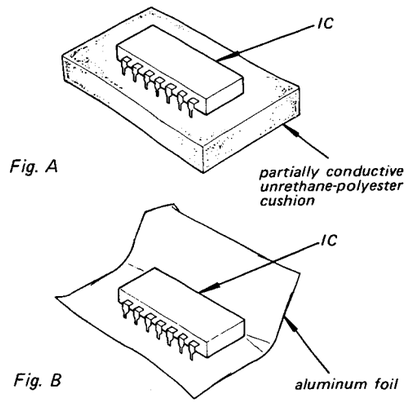


Fig. A

Fig. B

2. Check the soldering iron for possible power-line leakage current. Make sure that there is no leakage path by connecting an ohmmeter to the tip of the soldering iron and the plug as shown in Fig. C. If there is a leakage path, use some other soldering iron.

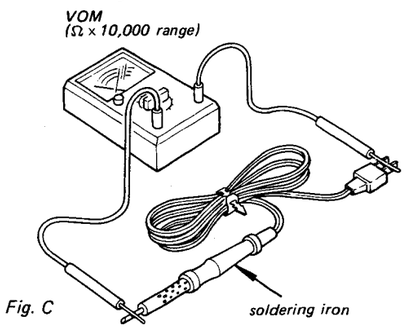


Fig. C

3. Equalize any potential difference between the clothes, the tools in use, the work bench, the set being worked on, and the packaged IC by touching them all in succession with the hands or a conductive wire or tool.
4. The following are effective methods for handling ICs that remove the potential difference across the oxide layer.
   - Use a paper clip modified by soldering in a wire braid insert.

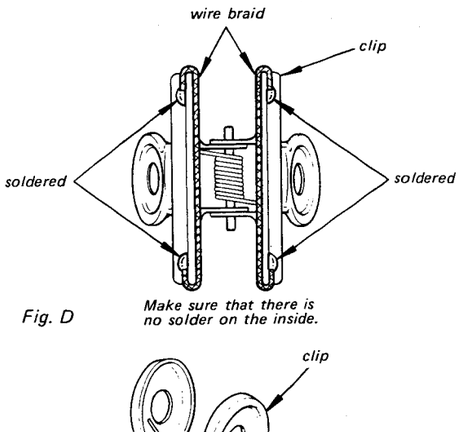


Fig. D Make sure that there is no solder on the inside.

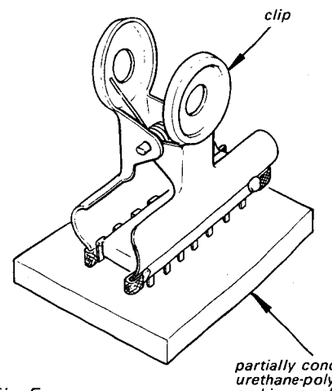


Fig. E

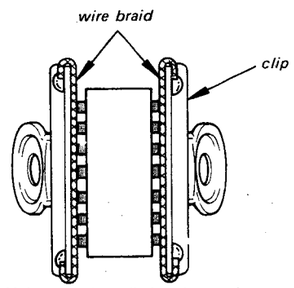


Fig. F Make sure that all the pins are in contact with the wire braid (all the pins will then be at the same potential.).

- Take a short length of fine bare wire and wind it around the IC so that it shorts all the pins of the IC, while it is still in the urethane-polyester cushion or aluminum foil. This ensures that all the pins are at the same potential.

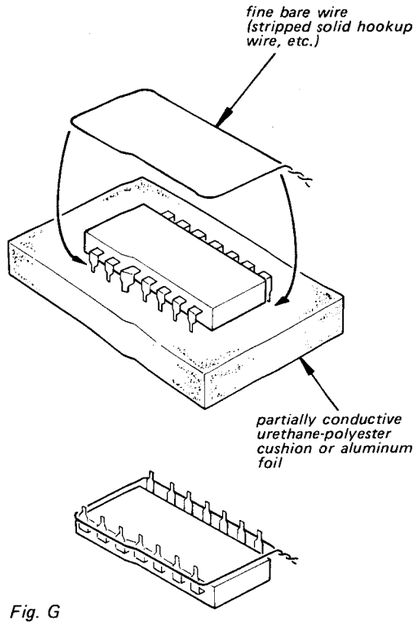


Fig. G

- When it is necessary to handle the IC with the fingers, do not touch any pin, and hold the IC at the ends of its plastic-package case as shown in Fig. H.

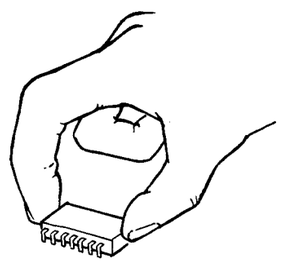


Fig. H

5. Method of Mounting
Insert the IC while holding it with the modified clip, and solder all the pins with the clip still shorting the pins. (Similarly, solder all the pins while the bare shorting wire is still wound around them.). Remove the clip or the bare shorting wire only after all the pins have been soldered.

Precaution while Checking C-MOS ICs

The C-MOS ICs (Complementary MOS) are MOS ICs that have their output sections made up of N-channel and P-channel push-pull stages to increase their speed of operation. If the output terminal of these ICs comes into contact with B+ or B- voltage, then the FET which is ON at that time will either become shorted or open.

This is valid for all the output sections that are connected together by the interconnections. Even the circuits that are physically separated (and not on the same board) can be destroyed simultaneously.

Example:

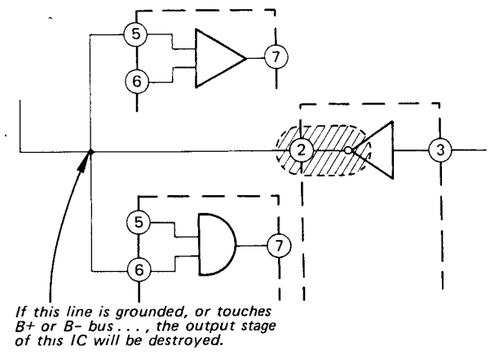


Fig. I

FEATURES

ASP IC
A newly-developed ASP (Audio Signal Processor) IC and the TC-FX1010's built-in microcomputer have made it possible to replace all mechanical switches with electronic keys and to shorten and simplify the signal path.

Status memory function
The optimum recording and playback settings for particular program sources and particular tapes can be memorized and instantly retrieved.

Three-head system with S&F (Sendust and Ferrite) heads
Separate recording and playback heads provide extended frequency response. Good tape-to-head contact is assured by mounting the heads on a single block and adjusting each head separately for more precise azimuth alignment.

Dual-capstan tape drive
Two capstans and two pinch rollers ensure uniform tape tension and stable tape-to-head contact. As a result, wow and flutter and modulation noise are greatly reduced.

Automatic calibration
An automatic calibration system adjusts the bias current and the recording sensitivity for each particular cassette.

Self monitor function
The recording being made is monitored and the indicators warn if the recorded signal level is lower than the source signal level.

Dolby C-type noise reduction system
In addition to the conventional B-type Dolby NR system, the TC-FX1010 incorporates the newly-developed C-type Dolby NR system which is twice as effective in reducing noise as the B-type system. In the C-type system, an anti-saturation network extends the dynamic range in the high frequencies.

Automatic recording level attenuation
Any input level higher than the MOL (Maximum Output Level) is automatically attenuated during recording so that the recorded sound will not be distorted.

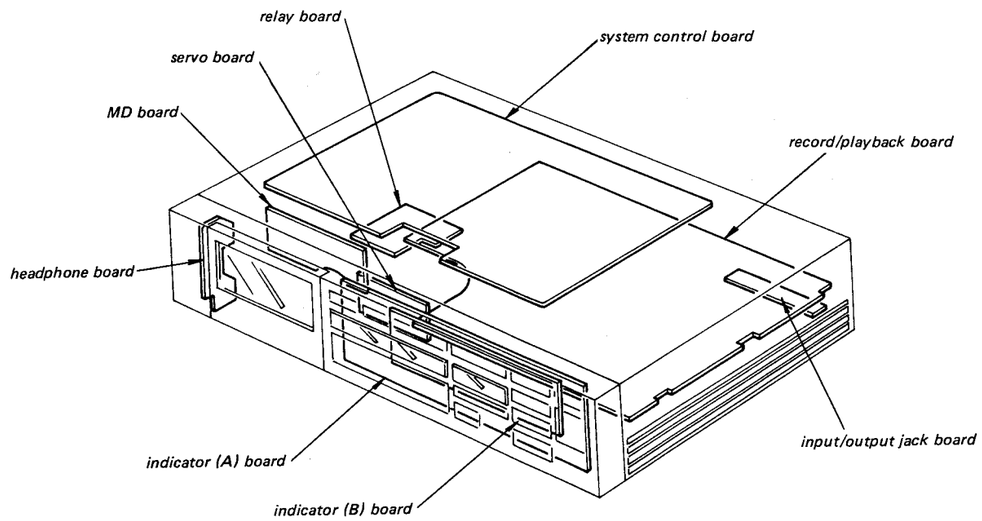
Adjustable MOL balance
You can adjust the bias current to suit the program source to be recorded.

Digital linear counter
This counter can indicate the elapsed recording or playback time so that the tape can be accurately indexed. It can also indicate the remaining time left to record before the tape runs out.

Automatic tape type detection
When a cassette is inserted, the type of tape is automatically detected and the optimum bias current for recording and the optimum equalization setting for both recording and playback for the type of tape used is automatically set.

Quick-access operation
The TC-FX1010 can be instantly powered by pressing the ⏏ key or function keys which initiate the function directly without pressing the POWER key.

Circuit Boards Location

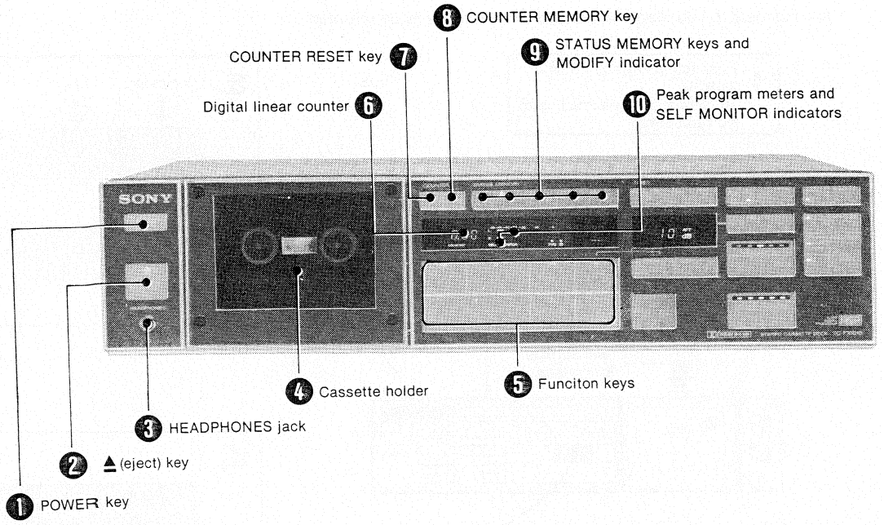


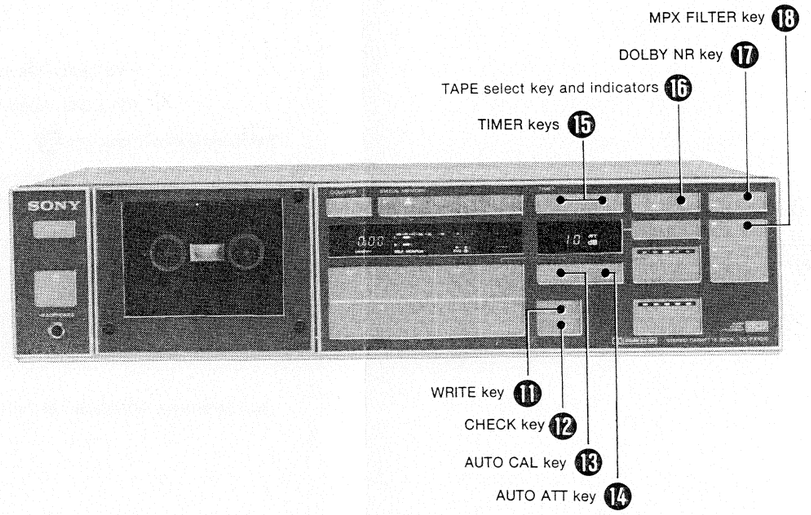
SECTION 1
OUTLINE

1-1. OUTLINE

FUNCTION OF CONTROLS

The numbers in the photo are keyed to the following explanations.





❶ POWER key
This turns the power on or off.

❷ ▲ (eject) key
Press this key to open the cassette holder.

❸ HEADPHONES jack
Headphones may be inserted either to monitor the input signals to be recorded or to listen to a recording in the playback mode. Headphone volume is adjustable with the LINE OUT/HEADPHONES level control key.

❹ Cassette holder

❺ Function keys
It is possible to switch directly from one mode to another. The indicator lamp of other than ■ (stop) or ○ (REC MUTE) key will light up when it is pressed.

- ◀◀ (rewind) key: Press this key to rewind the tape.
- ▶ (forward) key: Press this key to play the tape back. To record, press this key and the ● key simultaneously.
- ▶▶ (fast-forward) key: Press this key to advance the tape rapidly.
- ● (record) key: Press this key together with the ▶ key to start recording. Also press this key before adjusting the recording level.
- ■ (stop) key: To stop the tape, press this key. The tape will stop automatically when it is completely wound up in either direction.
- ▮▮ (pause) key: To pause for a moment during recording or playback, press this key. This key is also used to control more precisely the start of recording and to release the record muting mode.
- ○ (record muting) key: Press this key to eliminate unwanted material and to insert a blank space during recording. See "Record muting" on page 17.

❻ Digital linear counter
This counter indicates the tape running time.
(Refer to "Using the digital linear counter" on page 16.)

❼ COUNTER RESET key
Press this key to set the counter to zero.

❽ COUNTER MEMORY key
Use the COUNTER MEMORY key to locate a particular point on the tape easily and quickly. Press the key to display the MEMORY indicator. The tape deck can be set to stop when the cassette is rewound to "–0.01" on the counter, and, if the ▶ and ◀◀ keys have also been pressed, set to begin playback automatically from that point. Press the key again to cancel it. See "Memory stop/play" on page 17.

❾ STATUS MEMORY keys and MODIFY indicator
The recording and playback settings as set by **the TAPE select key, the DOLBY NR key, the MPX FILTER key, the AUTO CAL key, the AUTO ATT key, the REC LEVEL control key, the REC BALANCE control key, the LINE OUT/HEADPHONES level control key, the BEEP key and the MOL BALANCE key** can be stored on the four STATUS MEMORY keys. Simply press the appropriate key to retrieve the desired setting. The pressed key will light.
When you have retrieved a particular setting with a STATUS MEMORY key, you can modify the recording and playback setting as necessary. When you do, the MODIFY indicator will light. To restore the setting on the STATUS MEMORY key, simply press the lightened STATUS MEMORY key. The MODIFY indicator will go out.

❿ Peak program meters and SELF MONITOR indicators
These meters show the peak input level of each channel during recording, and recorded levels in the playback mode. They follow the transient peaks of high-level inputs that are too brief to be followed by conventional VU meters so that the optimum recording level can be accurately set. For easy reading the highest input of each channel is held for about 4 seconds on the scale, except when a higher peak occurs before 4 seconds have passed, in which case that peak is immediately indicated.
The SELF MONITOR indicators will blink when the recording is distorted.

⓫ WRITE key
To store the optimum recording and playback settings in the STATUS MEMORY keys, first press this key and then one of the STATUS MEMORY keys.

⓬ CHECK key
To check the settings stored in the STATUS MEMORY keys, press this key. The settings will be displayed in sequence so that you can check them during the playback mode. This key doesn't operate during the recording mode.

⓭ AUTO CAL (automatic calibration) key
Press this key to automatically calibrate the bias and recording sensitivity for the tape being used to record.

⓮ AUTO ATT (automatic attenuator) key
Press this key to automatically attenuate the preset recording level when the input level is too high, so that the recording will not be distorted. Press the key again to cancel the automatic attenuation.

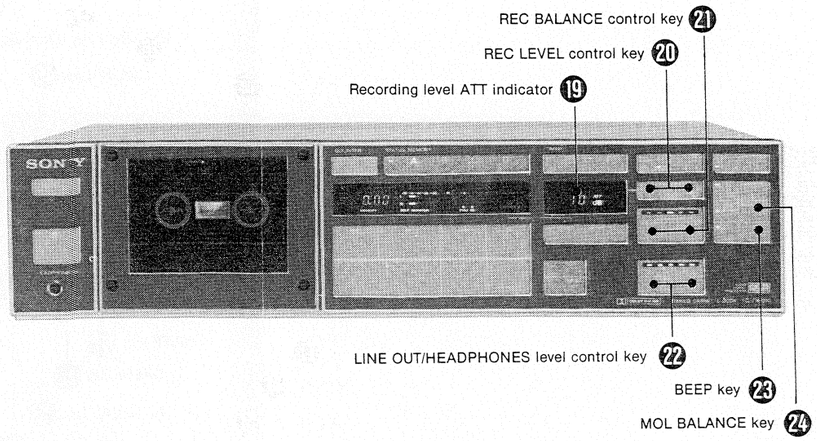
⓯ TIMER keys
You can set the unit to record or play back at a predetermined time by connecting any commercially available timer. To record, press the REC key. To play back, press the PLAY key. Each indicator illuminates. See "Timer-activated recording and playback" on page 18.

⓰ TAPE select key and indicators
When a cassette is inserted, the appropriate tape indicator lights up and the optimum recording and playback settings for the tape are automatically set by the automatic tape select system. Press this key if the indicator and the type of tape inserted are not the same. This key does not operate if a cassette has not been inserted. See page 11.

⓱ DOLBY NR key
Press this key to select the Dolby* NR system when recording or playing back. The type of Dolby NR system applied will change in the following sequence when the key is pressed: Dolby NR B type (B indicator illuminates), Dolby NR C type (C indicator illuminates), Dolby NR off (indicator off).

* "Dolby" and the double-D symbol are trade marks of the Dolby Laboratories. Noise reduction system manufactured under license from Dolby Laboratories.

⓲ MPX FILTER key
When recording FM stereo broadcasts with the Dolby NR system, press this key to ON (the indicator lights up) if the 19 kHz pilot signal and the 38 kHz subcarrier have not been adequately supressed by the FM tuner or receiver. If the tuner or the receiver supresses such signals adequately (most high-quality tuners and receivers will), you do not have to press this key to ON. Normally set the key so that the indicator is off.



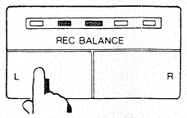
⑲ Recording level ATT (attenuation) indicator
The recording level set by the REC LEVEL key is indicated in dB. Note that the level is higher when the indicated number is smaller. For example: If the + side of the REC LEVEL key is kept depressed, the indicator will count down to 00 dB, at which point the recording level will be at the maximum. If the – side is pressed, the indicator will count up to 40 dB, at which point the recording level will be at the minimum.

⑳ REC LEVEL (recording level) control key
Adjust the recording level by watching the peak program meters and the recording level ATT indicator. Press the + side to increase the level and the – side to decrease it.

㉑ REC BALANCE (recording level balance) control key
This controls the balance of the left and right channel recording levels.

Normal position of the indicator

If the right(R) channel level is too high, press the L side once.
The right channel level will lower.



If the right channel level is still too high, press the L side again.

The right channel level cannot be lowered further than this.

㉒ LINE OUT/HEADPHONES level control key
This key adjusts the output level of the LINE OUT jacks as well as the headphone level. At the "0" position, the rated output is obtained. Press the – side to reduce the output level by 2 dB. The level will change continuously if the key is kept pressed.

㉓ BEEP key
When this key is pressed, the indicator will light up and an alarm will sound when any key other than the function keys, the POWER key or the ⏏ key is pressed. Press this key again to cancel this function.

㉔ MOL BALANCE key
This key is used to select one of the three MOL (Maximum Output Level) settings most appropriate for the type of program to be recorded. The indicator will change in the following sequence when the key is pressed: NORM—SHARP—NORM—SOFT—NORM.

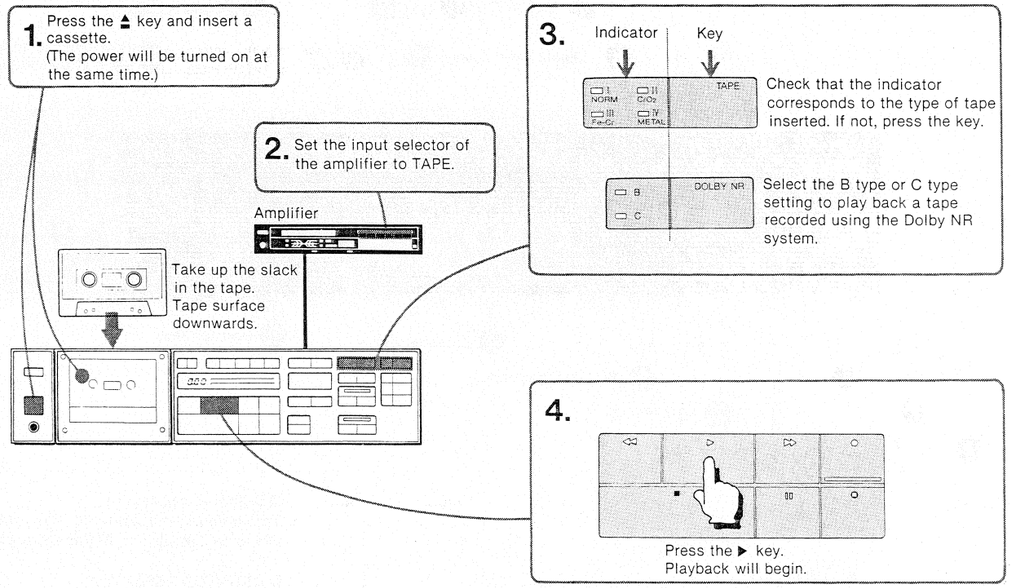
SHARP: Recommended for recording programs with the high frequency range predominating as in jazz or synthesizer music.
NORM: For normal recording.
SOFT: Recommended for recording the program with the low frequency range predominating as in classical music.

When the tape type is changed, the indicator will automatically return to NORM.

ISS (Interference suppress switch) (on the rear)
If interference is encountered while recording MW or LW program, use the ISS switch to suppress the interference. Slide the switch to 1 or 2 position, depending on which best reduces the noise.

PLAYBACK

The numbers in this diagram indicate the sequence to be followed.



Tape list

Tapes (C-60 and C-90)		TAPE
SONY: AHF, BHF MAXELL: UD, UD-XL I SCOTCH: MASTER I BASF: ferro super LH1	AGFA: SUPER FERRO DYNAMIC FUJI: FX-I PHILIPS: SUPER FERRO-I TDK: SD	TYPE I (NORMAL)
SONY: UCX-S, CD-α MAXELL: UD-XLII, XLII-S SCOTCH: MASTER II BASF: chromdioxid	AGFA: STEREO CHROM FUJI: FX-II PHILIPS: CHROMIUM TDK: SA, SA-X	TYPE II (CrO_2)
SONY: FeCr SCOTCH: MASTER III BASF: ferrochrom	AGFA: CARAT PHILIPS: FERRO CHROMIUM	TYPE III (Fe-Cr)
SONY: METALLIC	Other metal tapes	TYPE IV (METAL)

When turning on the power—
To turn the power on, you can press the POWER key, the ⏏ key, the function keys, the COUNTER RESET key, the COUNTER MEMORY key or the STATUS MEMORY keys.
When the power is turned on, all indicators illuminate, the ▮▮ key blinks, and the recording level ATT indicator and the tape counter count down from 77 to 00 to indicate that the unit is in the standby mode.
The keys listed below will operate as soon as the unit leaves the standby mode.
Funciton keys (▶, ▶▶, ◀◀, ●), STATUS MEMORY keys, COUNTER RESET key

Note: Do not press the ● key and ▶ key during the standby mode to avoid starting the recording mode.

When turning the power off—
Press the POWER key to turn the power off.
The power will also be turned off automatically if the unit is left for about 60 minutes in the stop mode.

AUTOMATIC TAPE SELECT SYSTEM
When a cassette is inserted, this automatic tape select system is actuated by the cassette's arrangement of detector slots and automatically sets the optimum recording and playback settings.

	TYPE I (NORMAL) cassette	TYPE II (CrO_2) cassette	TYPE III (Fe-Cr) cassette	TYPE IV (METAL) cassette	
Tape detector slots	the tab	CrO_2 tape detector slots	same as the TYPE I cassette	METAL tape detector slots	METAL tape which has no METAL tape detector slots
TAPE indicator	I NORM, II CrO_2, III Fe-Cr, IV METAL	I NORM, II CrO_2, III Fe-Cr, IV METAL	I NORM, II CrO_2, III Fe-Cr, IV METAL	I NORM, II CrO_2, III Fe-Cr, IV METAL	I NORM, II CrO_2, III Fe-Cr, IV METAL

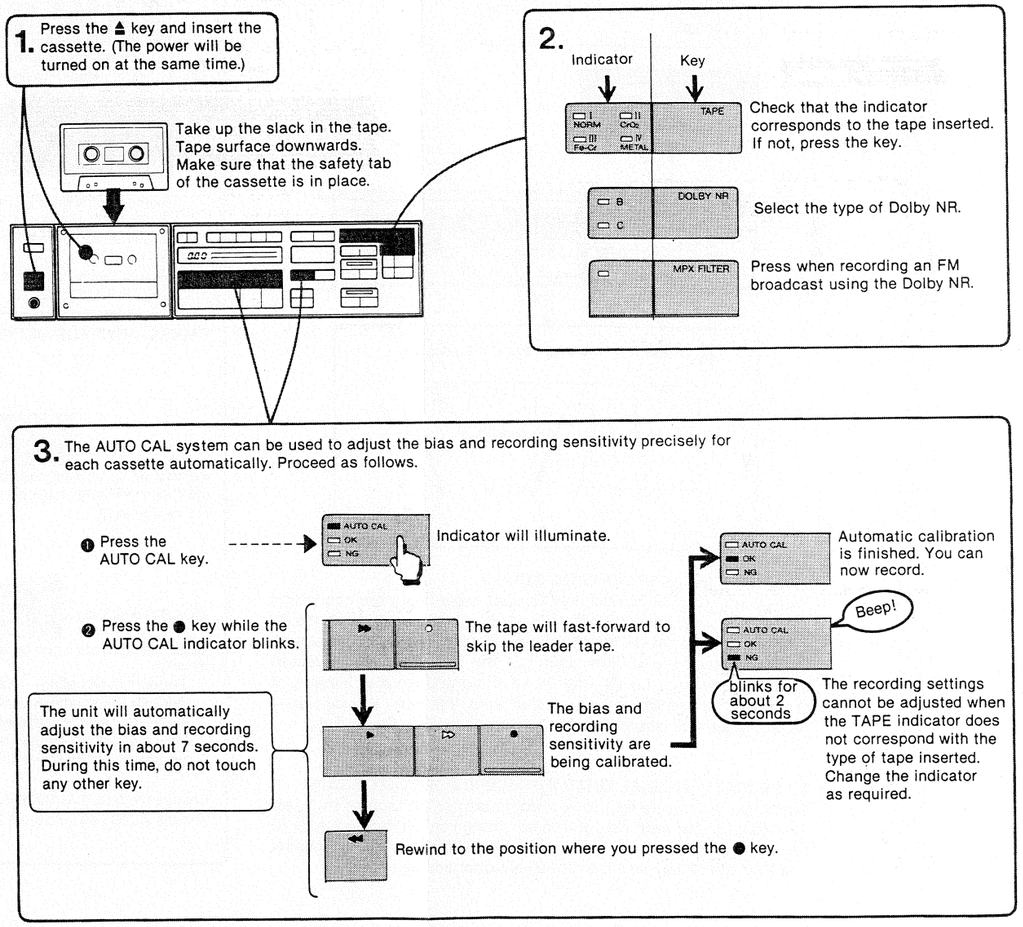
As shown in the above illustration, TYPE I, II and IV cassette tapes will be detected automatically.

Exception to the automatic tape select system
- When inserting TYPE III or TYPE IV cassettes which have no METAL tape detector slots, the correct TAPE indicator does not light up and the automatic tape select system cannot work properly. In this case, press the TAPE key so that the correct TAPE indicator lights up.
- If the TAPE indicator is TYPE III or TYPE IV and the TYPE I or II cassette is inserted, press the TAPE key so that the indicator will be correct.

Note
We do not recommend using TYPE IV cassettes without METAL and CrO_2 tape detector slots.

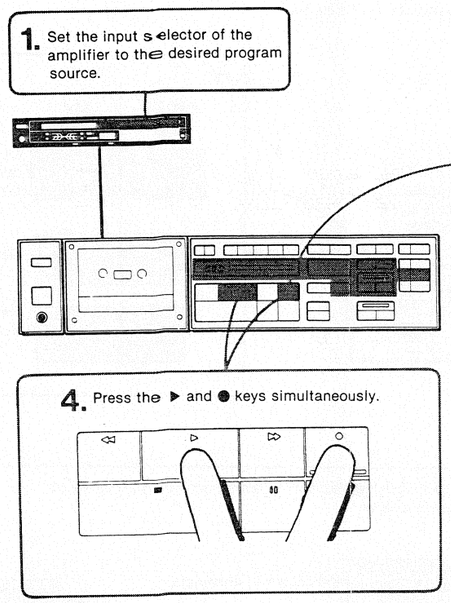
RECORDING

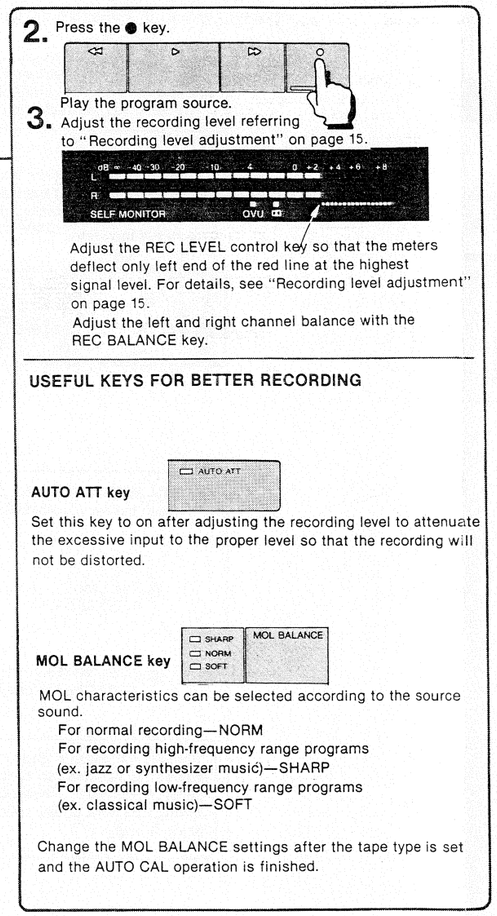
BEFORE RECORDING
The numbers in this diagram indicate the sequence to be followed.



Notes on the AUTO CAL operation
- The OK indicator and the adjusted settings will be cancelled if the tape type is changed after the AUTO CAL operation.
- Even if the NG indicator does blink, you can record with the inserted tape, because the approximate settings are adjusted by the automatic tape select system. Note that 120-minute tapes and certain metal tapes are apt to be NG. Always use tape of good quality.

TO START RECORDING





MORE ACCURATE RECORDING STARTS

You can use the ■■ (pause) key to start recording more accurately than is possible when recording is started by pressing both the ● (record) key and the ▶ (forward) key. Before adjusting the recording level, press the ■■ key, then put the tape deck in the record mode by pressing the ● and ▶ keys simultaneously, instead of pressing only the ● key as in step 2. In this way, you can start recording exactly where you want by pressing only the ■■ key.

TO RECORD MATERIAL ONTO A SPECIFIC PORTION OF TAPE

When you want to re-record a specific portion of tape or to insert new material between two points on a tape you will find it handy to be able to change directly from the playback to the record mode by pressing the ● key and the ▶ key simultaneously.

USEFUL KEYS FOR BETTER RECORDING

AUTO ATT key

Set this key to on after adjusting the recording level to attenuate the excessive input to the proper level so that the recording will not be distorted.

MOL BALANCE key

MOL characteristics can be selected according to the source sound.

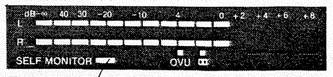
For normal recording—NORM
For recording high-frequency range programs (ex. jazz or synthesizer music)—SHARP
For recording low-frequency range programs (ex. classical music)—SOFT

Change the MOL BALANCE settings after the tape type is set and the AUTO CAL operation is finished.

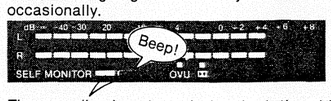
SELF MONITOR

As this tape deck has separate record and playback heads, the unit will automatically compare the source with the recorded sounds in the recording mode. If there is a difference in the sound levels, the SELF MONITOR indicators will blink to indicate that the heads are contaminated and should be cleaned or the recording level setting is too high.

- Only the source sound can be monitored during recording.
- Note that the red and white indicators will always blink on the leader tape.



The recording is good when only the white indicator blinks occasionally.

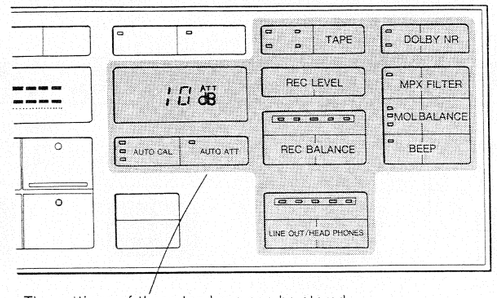


The recording is not good when both the white and red indicators blink. An alarm will sound when the red indicator blinks. Check that the head is not contaminated or that the recording level setting is not too high.

RECORDING AND PLAYBACK USING THE STATUS MEMORY FUNCTION

The TC-FX1010 can store and retrieve recording and playback settings. Once a setting has been stored on a STATUS MEMORY key, you can retrieve it by pressing the key.

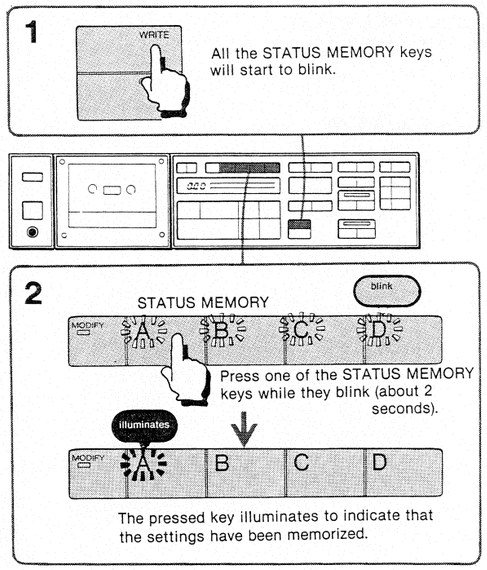
WHICH KEYS CAN BE STORED?



The settings of these ten keys can be stored.

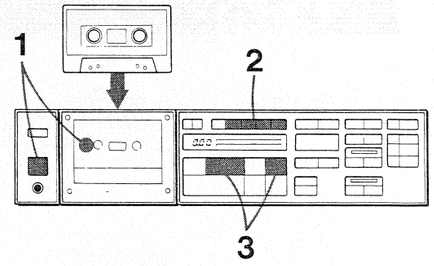
TO STORE THE SETTINGS

Adjust the settings to store in the STATUS MEMORY key before entering them into the status memory. Once the settings are committed to memory, they cannot be cancelled or adjusted until new settings are stored on the STATUS MEMORY key.



TO RECORD OR PLAYBACK USING THE STATUS MEMORY KEYS

❶ Press the ▲ key and insert a cassette.
❷ Press a STATUS MEMORY key.
❸ Start recording or playback.



TO CHANGE SOME OF THE SETTINGS MEMORIZED ON A KEY

For example : To change some of the settings stored on the B key

❶ Press the B key to recall the settings.
❷ Change the settings you want.
→ The MODIFY indicator will illuminate.

MODIFY indicator
This indicator illuminates to show that the some of the settings of the STATUS MEMORY key have been changed. The indicator illuminates till the STATUS MEMORY key is pressed again.

To recall the original settings, press the B key again.
To store the newly-adjusted settings, press the WRITE key and one of the STATUS MEMORY keys.

TO CHECK THE STORED SETTINGS

Once the settings have been memorized, you can check them by pressing the CHECK key. The check can be made during the stop and playback mode.

❶ Press the CHECK key. → A — The A key will blink for about 3 seconds and the settings of the keys memorized on the A key will illuminate.

❷ Press the CHECK key again while the A key indicator blinks.
→ B — The B key will blink and the settings of the keys memorized on the B key will illuminate.

In this way, you can check settings memorized on the A, B, C and D keys in order.

- The settings illuminated during the check will automatically return to the original settings.
- Note that the CHECK key doesn't operate in the recording mode.

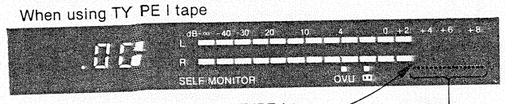
Note on the memory back-up circuit

The memorized settings will not be cancelled even when the power goes off for several months so you can retrieve them whenever you want. This is because the unit has a battery-powered back-up circuit which permits you to move the unit from one place to another or to operate it after a blackout. If the power cord is disconnected for a long time, however, the memorized settings will be cancelled. In this case, connect the power cord to charge the battery.

RECORDING LEVEL ADJUSTMENT

Adjust the recording level while monitoring on the peak program meters the input level of the program source to be recorded. If the recording level setting is too high, the recording will be distorted, and if the setting is too low, the recording will be noisy. The recording level should be set as high as possible while still avoiding distortion. This level will depend on the type of tape being used.
When the tape type is set, the range above the saturation level of the selected type of tape is indicated by the red line. Generally speaking, adjust the recording level by making sure that the meters deflect only to the left end of the red line at the highest signal level.

When using TYPE I tape



The saturation level of TYPE I tape

Range in which recording is distorted.

Since the saturation level of any tape is lower in the higher frequencies than in the lower frequencies, the recording level may still be too high if adjusted in this way if the program to be recorded contains many high frequency signals. Consideration has to be given to the program source to be recorded as well as to the characteristics of the cassette to be used, since each cassette, even cassettes using the same type of tape, may have different characteristics.

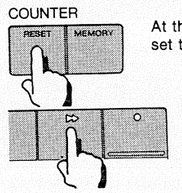
Setting the recording level using the AUTO ATT key
Play the program source in the recording standby mode. Set the recording level a little higher than the saturation level on the peak program meter. Then set the AUTO ATT key on. When signals at an excessive are input, the AUTO ATT function automatically attenuates the recording level to the proper level. In this way, the optimum recording level according to the tape type can be set to start recording.

USING THE DIGITAL LINEAR COUNTER

The first two digits of this tape counter show the approximate recording or playback time in minutes, and the last two digits show the seconds.

To index the whole tape
Before recording or playback, set the counter to "0.00" by pressing the COUNTER RESET key.
As the tape runs, the figures of the counter change. Note the numbers and the program being recorded or played back. Any point of the tape can thus be readily located later by reference to these numbers.

To check the available recording time on one side of a cassette

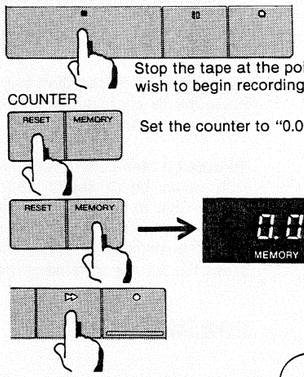


At the beginning of the tape, set the counter to "0.00".

Fast-forward the tape to the end.

The digits will show the approximate available recording time.

To determine the remaining recording time



Stop the tape at the point at which you wish to begin recording.

COUNTER

Set the counter to "0.00".

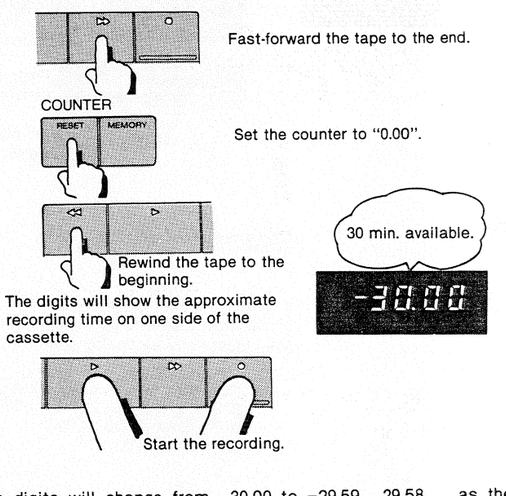
Fast-forward the tape to the end.

3 min. 45 sec. remaining.

The digits will show the approximate remaining recording time.

The tape will stop at "0.00".

To monitor the remaining recording time while recording
—Using the minus display
The counter shows the recording or playback time from the "0.00" point preceded by a minus sign when the tape is rewound beyond "0.00".



Fast-forward the tape to the end.

Set the counter to "0.00".

Rewind the tape to the beginning.

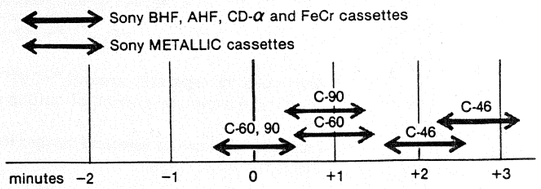
The digits will show the approximate recording time on one side of the cassette.

Start the recording.

The digits will change from −30.00 to −29.59, -29.58... as the recording goes on, and you can monitor the remaining recording time at any point on the tape.

The accuracy of the counter
This counter is not actually a digital clock, so that the displayed figures are not exactly equal to the actual elapsed time. The accuracy will vary depending on the type of tape being used. This counter has been designed using C-60 cassettes as the standard. Make sure that the displayed time is greater than the time required when using a C-46 cassette.

Difference between the counter indication and the actual tape running time on one side of a cassette

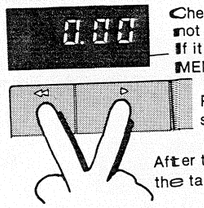


The counter indication is less than the actual tape running time.

The counter indication is more than the actual tape running time.

AUTO PLAY

To rewind the tape and play from the beginning of the tape, use the auto play function. The tape deck can automatically replay a tape immediately after rewinding.



Check that the MEMORY indicator is not displayed below the tape counter. If it is displayed, press the COUNTER MEMORY key.

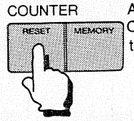
Press the ◀◀ key and the ▶ key simultaneously.

After the tape is completely rewound, the tape will automatically replay.

MEMORY STOP/PLAY

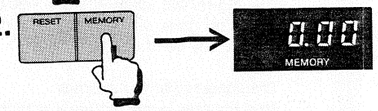
To rewind the tape to a desired point use the memory stop function. To play from a desired point use the memory play function. You can easily locate any particular point on a tape.

1. COUNTER



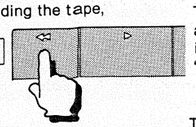
At the desired point on the tape, press the COUNTER RESET key to set the tape counter to "0.00."

2.



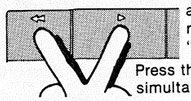
3. When rewinding the tape,

Memory stop



The tape stops automatically when it is rewound to the "–0.01" point.

Memory play



The tape replays automatically after rewinding to the "–0.01" point.

Press the ◀◀ and ▶ keys simultaneously.

Why does the tape stop around "–0.01"?
In order to avoid any chance of cutting off the starting point.

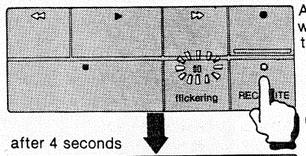
How can the tape be rewound further than "0.00"?
Press the ◀◀ key again.

RECORD MUTING

By pressing the O (record muting) key during recording, four seconds interspacing is provided automatically, eliminating unwanted program material such as broadcasting commercials. While the record muting is operating, the incoming signal is not recorded on the tape but it continues to register on the meters and feed to the monitor so that you know exactly what is going on.

To insert a 4-second blank automatically

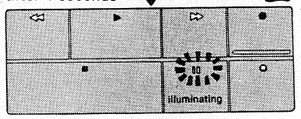
When the segment you do not wish to record begins,



A blank is made while the tape continues to run.

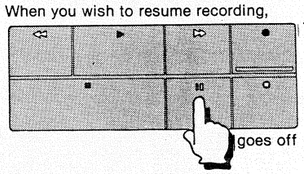
Press. (Do not keep pressing.)

after 4 seconds



The tape pauses.

When you wish to resume recording,



The tape starts to run.

goes off

To insert a blank less than four seconds long
Press the O key to mute recording. Press the ▮▮ key when you want to resume recording.

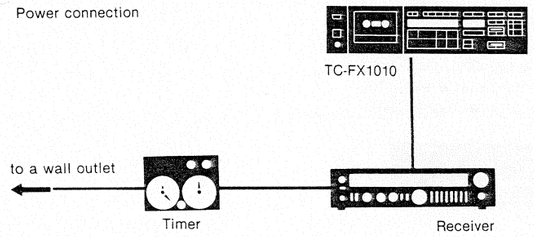
To insert a blank over four seconds long
Hold down the O key for as long as you want the blank segment on the tape to be. After four seconds, the indicator of the O key will blink more rapidly. When you release the ▮▮ key, the tape deck will be in the pause mode. When you want to resume recording, press the ▮▮ key to release the pause mode.

ERASING

When the tape deck functions in recording mode, the erase head automatically erases any previously recorded material.
To erase without recording:
❶ Make sure that the safety tab of the cassette is in place, or that the tab slot is covered with plastic tape.
❷ Check that the appropriate tape type is indicated.
❸ Keep pressed the — key of the REC LEVEL control. (Disconnecting all inputs will result in a more complete erasure.)
❹ Press the ● key and the ▶ key simultaneously.

TIMER-ACTIVATED RECORDING AND PLAYBACK

By connecting any commercially available timer to the tape deck, the deck can be set to play back or record automatically at any desired time. As timers work in different ways, be sure to read the timer's instruction manual carefully.



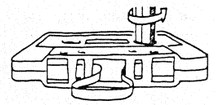
To record a broadcast using a timer
❶ Connect the tape deck, receiver and timer. Set the timer so that power is supplied to the connected equipment.
❷ Turn on the receiver and tune in the station which will broadcast the program you want to record.
❸ Turn on the tape deck and insert a cassette. Make sure that the tab is intact or that plastic tape covers the tab slot.
❹ Adjust the settings before recording and the recording level. (Press the appropriate A to D key when using the STATUS MEMORY key.).
❺ Press the TIMER REC key of the tape deck.
❻ Set the timer for the desired time. (At this point power to the connected equipment will be cut off.)
The tape deck is now ready to start recording at the time set on the timer.

To play back using a timer
The connections between equipment are the same as for recording using a timer.
❶ Turn on the receiver and set the appropriate switches for playback.
❷ Turn on the tape deck and insert the recorded cassette.
❸ Press the TIMER PLAY key of the tape deck.
❹ Set the timer for the desired time. (At this point power to the connected equipment will be cut off.)
The tape deck is now ready to start playback at the time set on the timer.

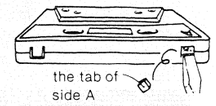
Notes
● Keep the power switches of the equipment to operate to ON. During the standby mode, the recording level ATT indicator and the tape counter will be as follows:
In the timer-activated recording, ▯ ▯ will blink.
In the timer-activated playback, ▷ ▷ will blink.
● Be sure that the tab of the cassette is intact when recording using a timer.
● When the timer function is not used for a long period of time, set the timer so that the power is always supplied to the tape deck.

NOTES ON CASSETTES

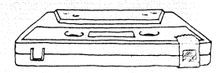
Cassette insertion
Before inserting a cassette, take up any slack in the tape to prevent it from becoming tangled around the capstan.



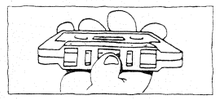
To protect cassettes from accidental erasure
Remove the tab as illustrated so that the record mode does not function when the ●(record) key is pressed.



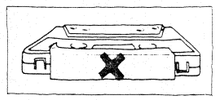
To record on a cassette once tabs have been removed, simply cover the slot with plastic tape.



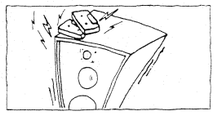
Cassette care
● Avoid touching the tape surface of a cassette, as any dirt or dust will contaminate the heads.



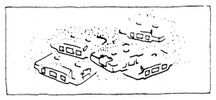
● Do not stick thick labels or tape on the cassette, as this may affect proper cassette alignment and prevent the tape from making proper contact with the heads.



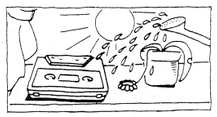
● Keep cassettes away from equipment with magnets, such as speakers and amplifiers, because their magnets could cause erasures or distortions of your recorded tapes.



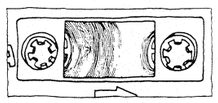
● Protect cassettes from dust by storing them in their cases. Even minor dirt or dust could contaminate the heads, resulting in noise and sound drop-outs.



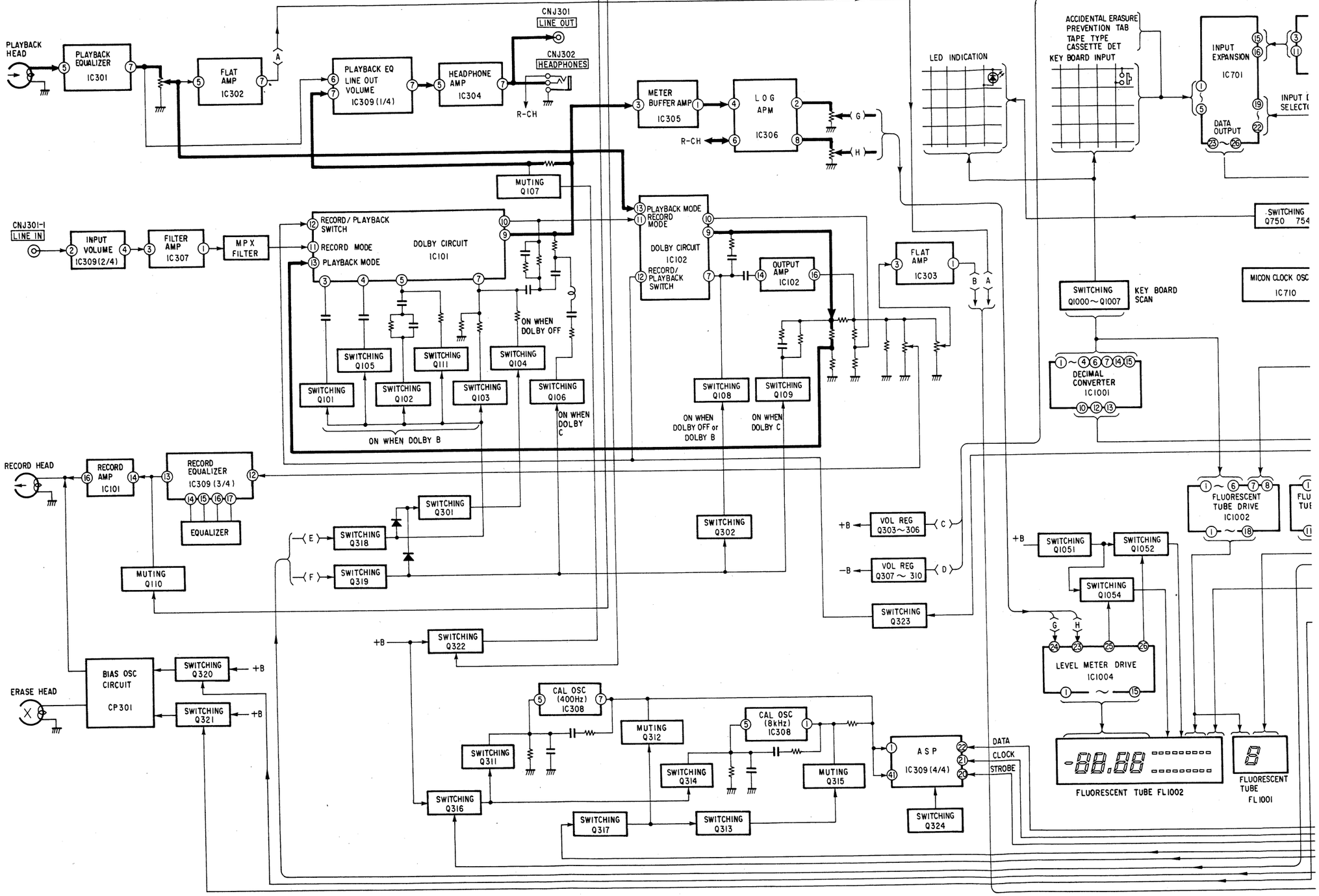
● Do not expose cassettes to direct sunlight, extremely cold temperature or moisture.

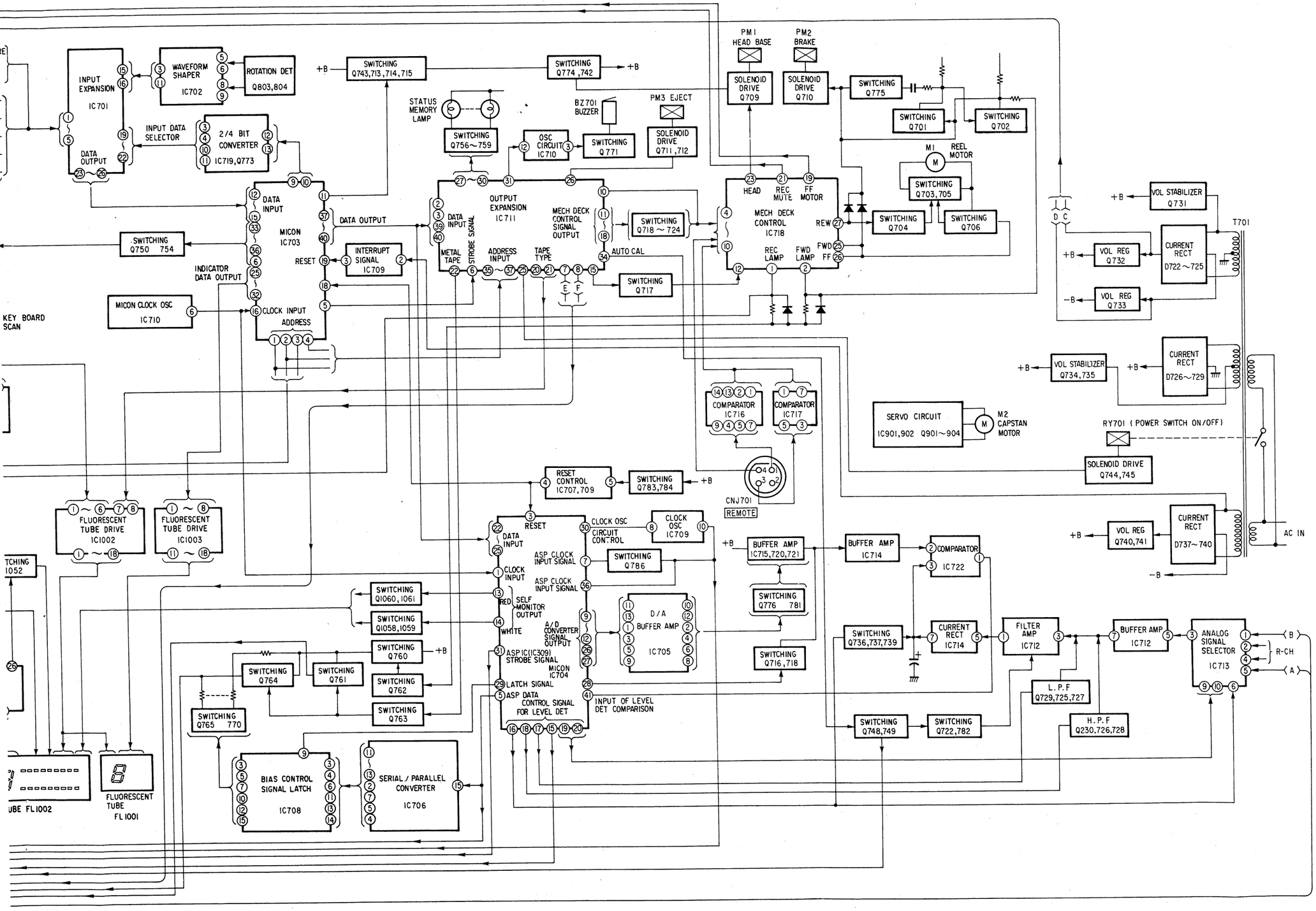


● Avoid fast-winding just before storing cassettes, as this may stretch the tape edge if the cassettes are left unused over a period of time.



1-2. BLOCK DIAGRAM



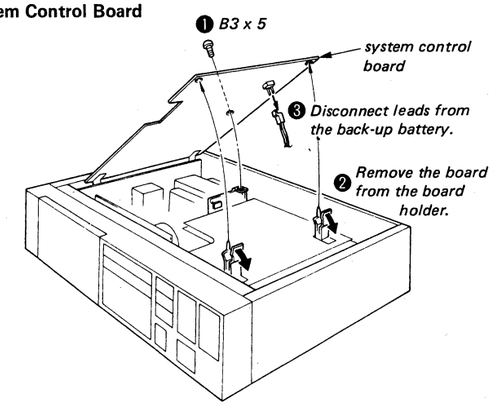

INPUT EXPANSION IC701
DATA OUTPUT
WAVEFORM SHAPER IC702
ROTATION DET Q803,804
INPUT DATA SELECTOR
2/4 BIT CONVERTER IC719,Q773
+B
SWITCHING Q743,713,714,715
SWITCHING Q774,742
STATUS MEMORY LAMP
SWITCHING Q756~759
OSC CIRCUIT IC710
BZ701 BUZZER
SWITCHING Q771
PM3 EJECT
SOLENOID DRIVE Q711,712
PM1 HEAD BASE
PM2 BRAKE
SOLENOID DRIVE Q709
SOLENOID DRIVE Q710
SWITCHING Q775
SWITCHING Q701
SWITCHING Q702
M1 REEL MOTOR
SWITCHING Q703,705
SWITCHING Q704
SWITCHING Q706
DATA INPUT
MICON IC703
RESET
INTERRUPT SIGNAL IC709
DATA OUTPUT
OUTPUT EXPANSION IC711
DATA INPUT
STROBE SIGNAL
METAL TAPE
ADDRESS INPUT
TAPE TYPE
MECH DECK CONTROL SIGNAL OUTPUT
AUTO CAL
SWITCHING Q718 ~ 724
SWITCHING Q717
MECH DECK CONTROL IC718
HEAD
REC MUTE
FF MOTOR
REW
FWD FF
REC LAMP
FWD LAMP
SWITCHING Q750 754
INDICATOR DATA OUTPUT
MICON CLOCK OSC IC710
KEY BOARD SCAN
CLOCK INPUT
ADDRESS
D C
VOL STABILIZER Q731
VOL REG Q732
VOL REG Q733
CURRENT RECT D722~725
T701
VOL STABILIZER Q734,735
CURRENT RECT D726~729
COMPARATOR IC716
COMPARATOR IC717
SERVO CIRCUIT IC901,902 Q901~904
M2 CAPSTAN MOTOR
RY701 (POWER SWITCH ON/OFF)
SOLENOID DRIVE Q744,745
RESET CONTROL IC707,709
SWITCHING Q783,784
CNJ701
REMOTE
CLOCK OSC CIRCUIT CONTROL
CLOCK OSC IC709
DATA INPUT
CLOCK INPUT
RESET
ASP CLOCK INPUT SIGNAL
SWITCHING Q786
SELF MONITOR OUTPUT
RED
WHITE
A/D CONVERTER SIGNAL OUTPUT
D/A BUFFER AMP IC705
ASP IC(IC309) STROBE SIGNAL
MICON IC704
LATCH SIGNAL
ASP DATA CONTROL SIGNAL FOR LEVEL DET
INPUT OF LEVEL DET COMPARISON
BUFFER AMP IC715,720,721
SWITCHING Q776 781
SWITCHING Q716,718
BUFFER AMP IC714
COMPARATOR IC722
SWITCHING Q736,737,739
CURRENT RECT IC714
FILTER AMP IC712
BUFFER AMP IC712
ANALOG SIGNAL SELECTOR IC713
R-CH
L.P.F Q729,725,727
H.P.F Q230,726,728
SWITCHING Q748,749
SWITCHING Q722,782
CURRENT RECT D737~740
VOL REG Q740,741
AC IN
SWITCHING Q1060,1061
SWITCHING Q1058,1059
SWITCHING Q760
SWITCHING Q762
SWITCHING Q763
SWITCHING Q764
SWITCHING Q761
SWITCHING Q765 770
BIAS CONTROL SIGNAL LATCH IC708
SERIAL / PARALLEL CONVERTER IC706
FLUORESCENT TUBE DRIVE IC1002
FLUORESCENT TUBE DRIVE IC1003
FLUORESCENT TUBE FL1001
UBE FL1002

SECTION 2
DISASSEMBLY

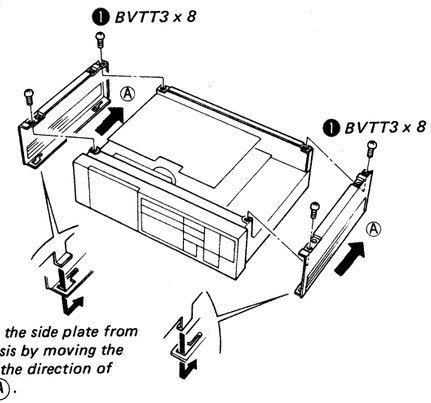
Note: Follow the disassembly procedure in the numerical order given.

Remove upper case by removing 4 screws (B3 x 5).

System Control Board

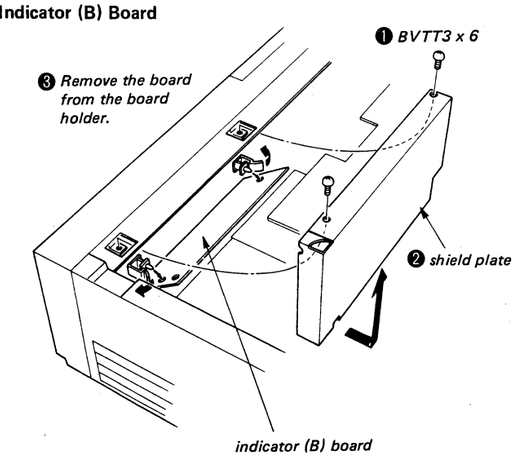


Side Plate

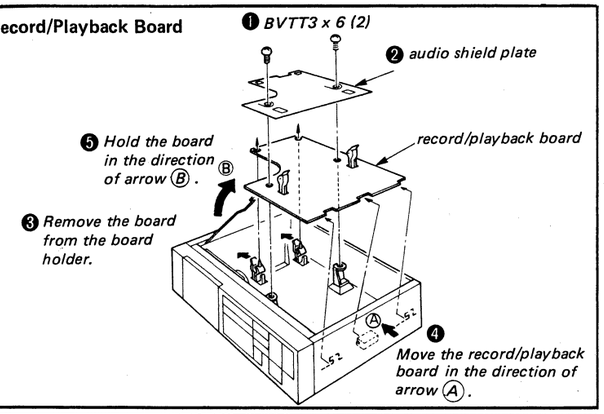


❷ Unhook the side plate from the chassis by moving the plate in the direction of arrow Ⓐ.

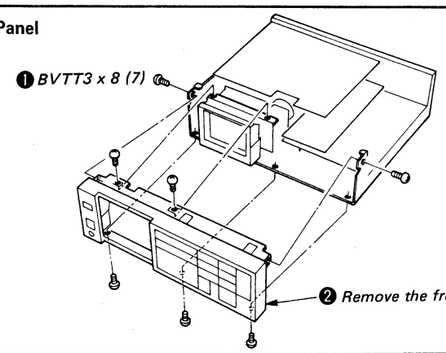
Indicator (B) Board



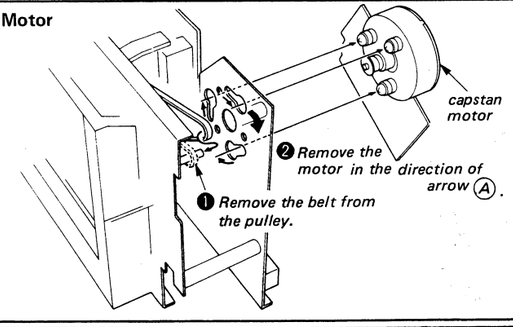
Record/Playback Board



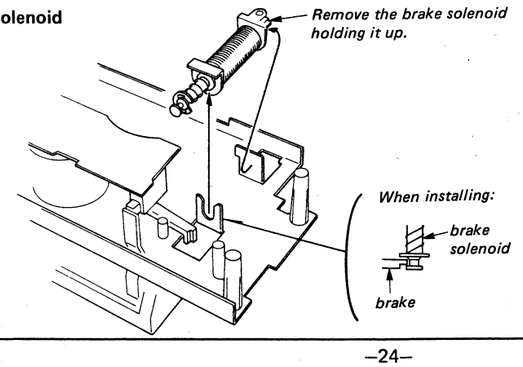
Front Panel



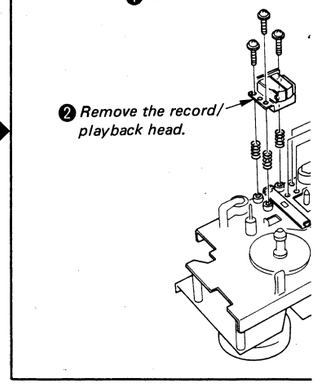
Capstan Motor



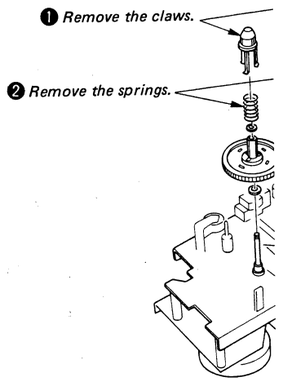
Brake Solenoid



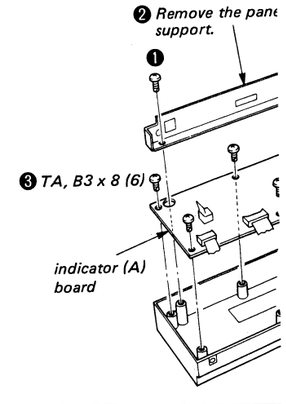
Record/Playback Head ... ❶ – ❷
Erase Head ..... ⚠ – ⚠



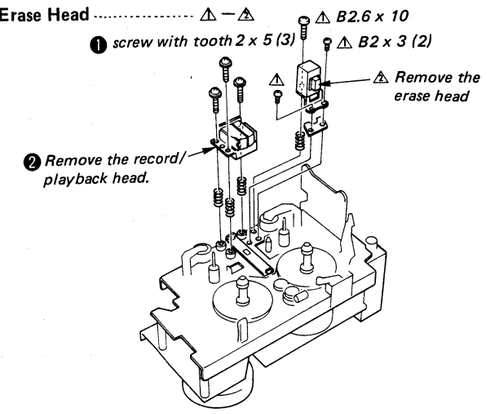
Reel Table



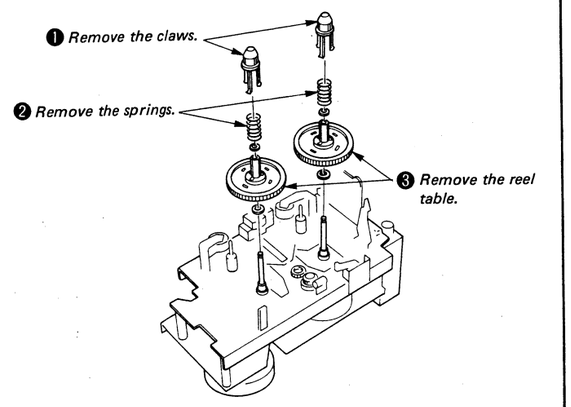
Indicator (A) Board



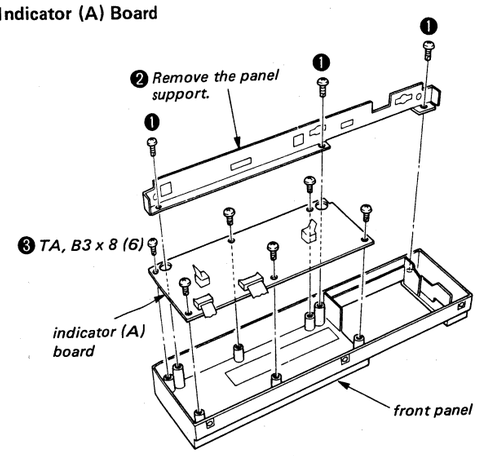
Record/Playback Head... ❶ – ❷
Erase Head ..... ⚠ – ⚠



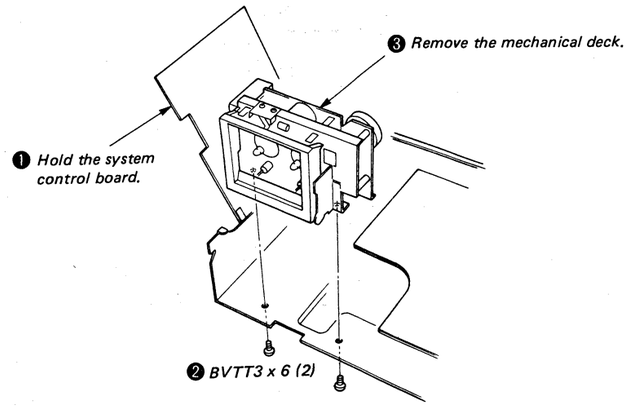
Reel Table



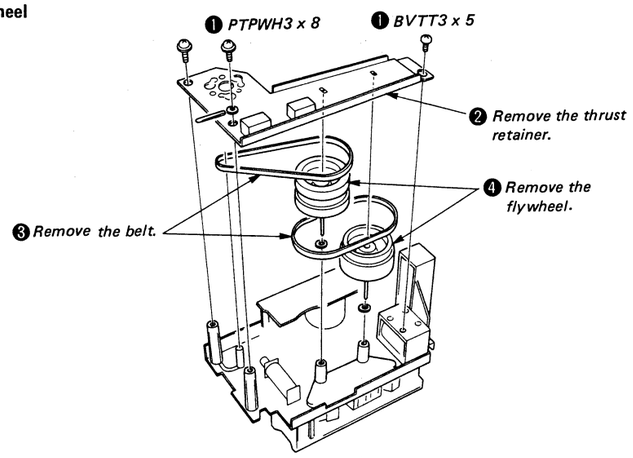
Indicator (A) Board



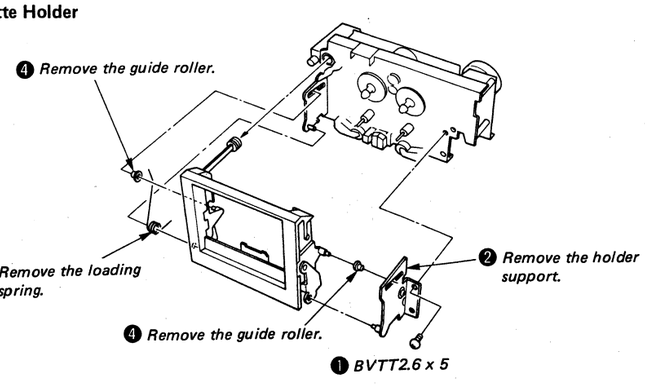
Mechanical Deck



Flywheel



Cassette Holder



SECTION 3
ADJUSTMENTS

3-1. MECHANICAL ADJUSTMENTS

PRECAUTION

1. Clean the following parts with a denatured-alcohol-moistened swab:

record/playback head	pinch roller
erase head	rubber belts
capstan	idlers

2. Demagnetize the record/playback head with a head demagnetizer.
3. Do not use a magnetized screwdriver for the adjustments.
4. After the adjustments, apply suitable locking compound to the parts adjusted.
5. The adjustments should be performed with the rated power supply voltage unless otherwise noted.

FF/REW Torque Measurement

Torque	Torque meter	Meter reading
FF REW	CQ-201B	65 – 85g·cm

Tape Path Adjustment

1. Insert a mirror cassette (CQ-009C).
2. Set for forward mode and confirm that there is no tape curl at the tape guides and recording head.
3. If there is curl, turn the adjust nut and raise and lower the supply side pinch roller (with tape guide attached) to adjust.
4. If step 3 does not get rid of the curl, adjust further by turning adjustment screws A, B, C less than ½ turn in the same direction at the same angle.
5. Confirm that the erase head height is as shown in Figure 2 .
6. Check tape wrinkling (zigzag).
   Tighten adjust screw D if the tape is wrinkling up. (clockwise)
   Loosen screw D if the tape is wrinkling downward. (conterclockwise)
   Repeat step 5 after adjusting screw D as necessary, within ½ turn.
7. Lock the screw with locking compound.

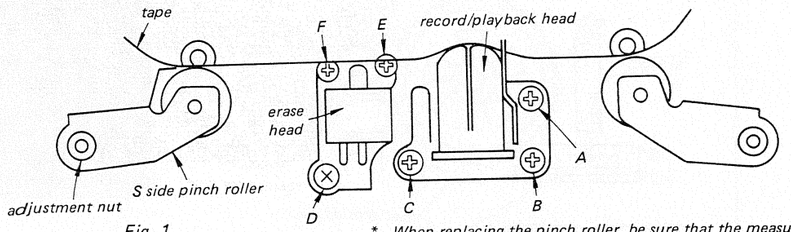


Fig. 1

* *When replacing the pinch roller, be sure that the measurements are as shown below when attaching it. (After installation, perform the above adjustment.)*

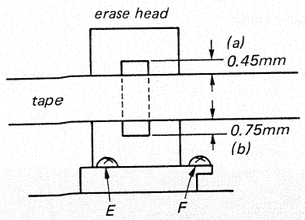


Fig. 2

1. *Loosen screws E, F so that the ratio between a and b is 3 : 5 and adjust with the adjustment shim.*
2. *When changing erase head height, check for tape wrinkling.*

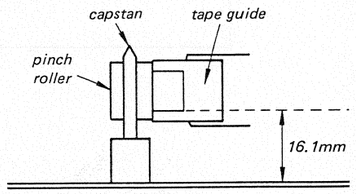
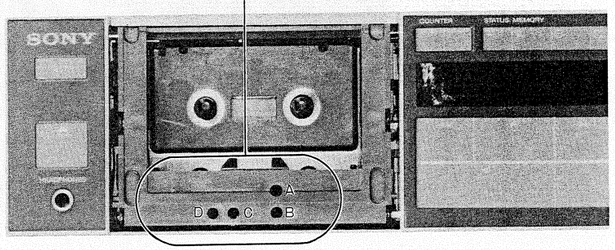


Fig. 3

tape path adjustment



Head Base Position Adjustment

Perform the following adjustment when replacing the head base solenoid.

Perform with the old head base solenoid still in place.

1. Press the head base solenoid core with the finger until the head base stops moving.
2. Draw a line as shown in Figure 2 . Replace with the new head base solenoid.
3. Loosen the mounting screw, match with the line drawn in step 2, and tighten the screw.
4. Lock the screw after adjustment.

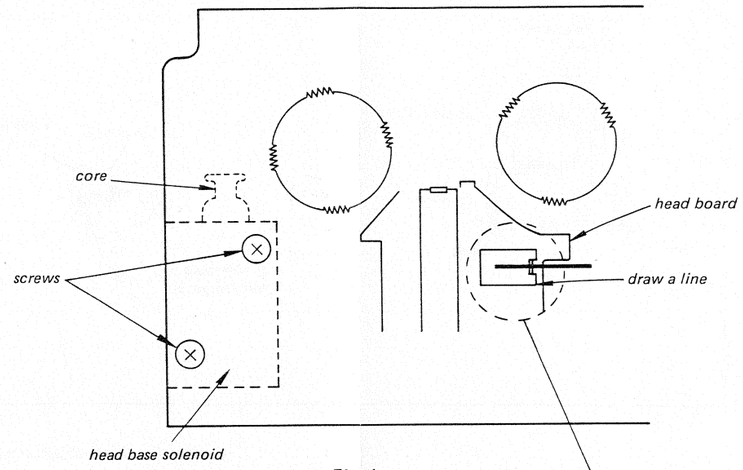


Fig. 1

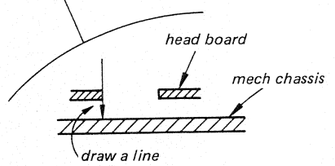
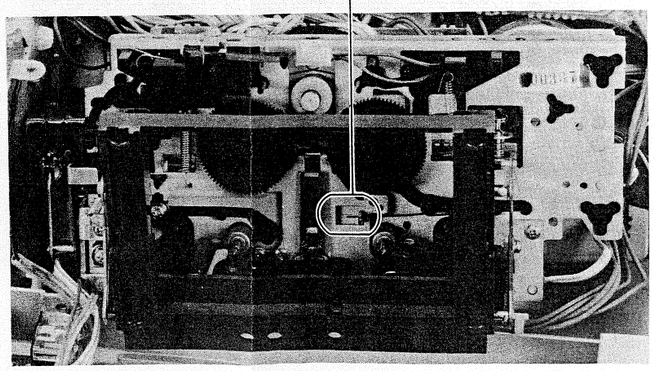


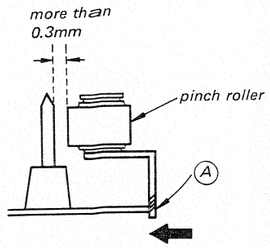
Fig. 2

head base position adjustment



Pinch Roller Clearance Adjustment

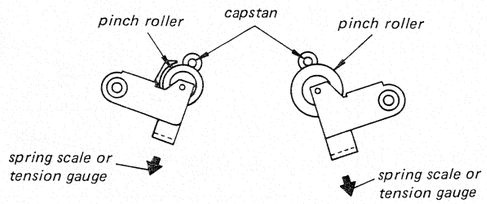
1. Confirm that the clearance between the pinch roller and capstan is more than 0.3mm in pause mode.
2. If it is less than 0.3mm, bend (A) in the direction of the arrow.



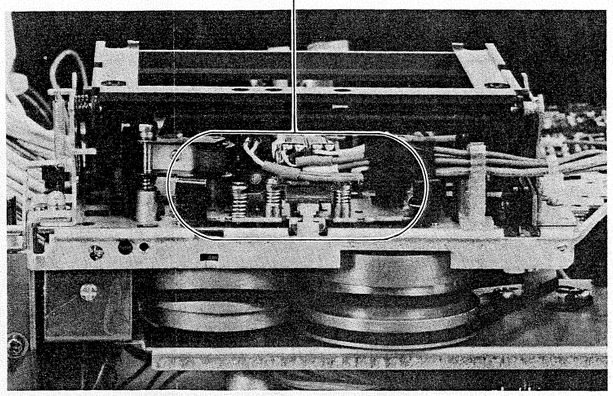
Pinch Roller Pressure Measurement

1. Confirm that the pinch roller is parallel to the capstan.
2. Set in forward, move the pinch roller away from the capstan, then back toward it, and measure the value at the point where the pinch roller begins to rotate.

   T side 270 – 330g
   S side 180 – 280g



pinch roller clearance adjustment

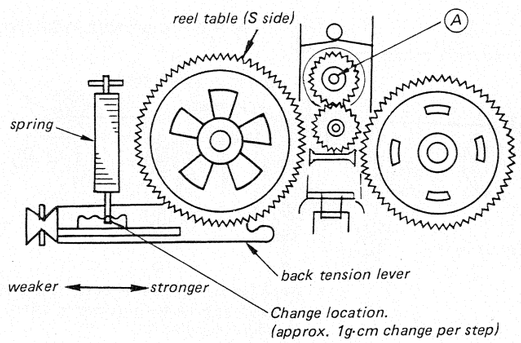


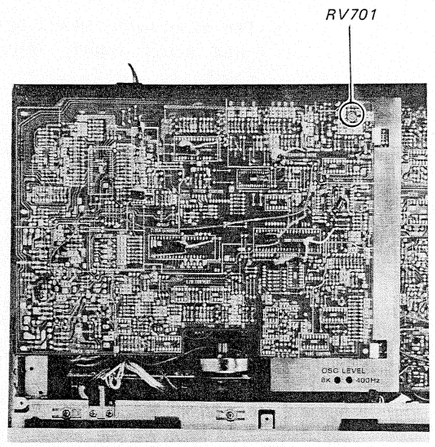
Forward Torque Adjustment

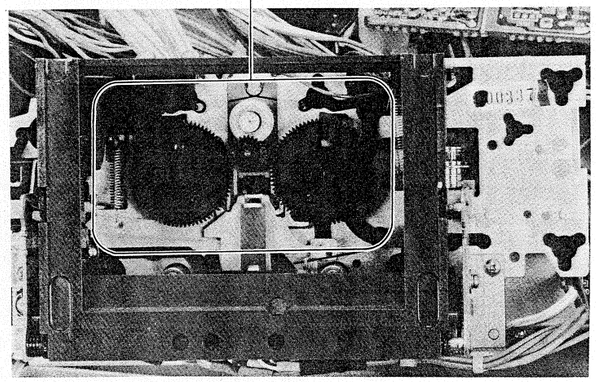
1. Remove the ornamental plate.
2. Press the cassette detection switch and T side reel table simultaneously by hand and then press the forward button. In this state, hold the T reel table so that it does not rotate.
3. Now adjust RV701 to the position where (A) begins to rotate.
   (It will shut off immediately, so press the forward button to repeat.)
4. Next insert CQ-102C, and measure forward torque and back tension torque. If back tension torque is not within the specifications, change the location where the spring is hooked.

Specifications:

forward torque: 30 – 50g · cm
back tension torque: 8.5 – 10.5g · cm

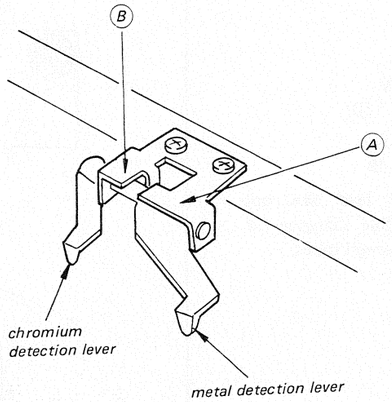


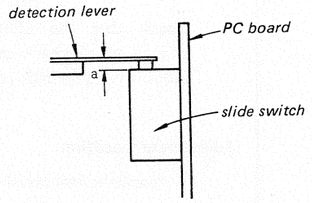


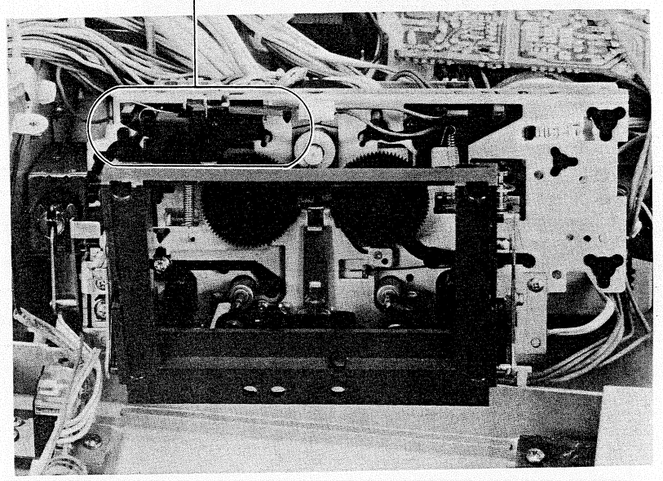


Detection Lever Adjustment

1. Insert a normal type tape.
2. Bend (A) to adjust so that the clearance "a" between the metal detection lever and slide switch is 0 – 0.1mm (0 – 1/32"). (Do not push too far.)
3. Next, bend (B) up and down to adjust so that the clearance "a" between the chromium detection lever and slide switch is 0 – 0.1mm (0 – 1/32"). (Do not bend too far.)







3-2. ELECTRICAL ADJUSTMENTS

Note: The adjustment should be performed in the order given in this service manual. The adjustments should be performed for both L-CH and R-CH.

- Set the TAPE switches according to the tape as follows.

Tape	TAPE switch
CS-15	TYPE I
CS-20	TYPE II
CS-30	TYPE III
CS-40	TYPE IV

- Switches and controls should be set as follows unless otherwise specified.

DOLBY NR switch:	OFF
TAPE switch:	TYPE I
TIMER switch:	OFF
LINE OUT/HEADPHONES:	MAX

- Standard Record:
  Deliver the standard input signal level to the input jack and set the REC LEVEL control to obtain the standard output signal level.

Standard Input Level

	LINE IN
source impedance	10kΩ
input level	0.25V (–10dB)

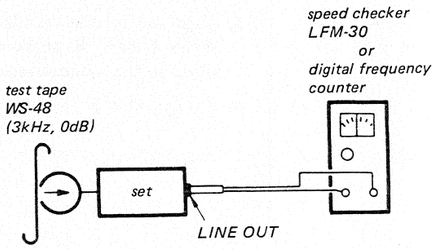
Standard Output Level

	PHONES	LINE OUT
load impedance	8Ω	47kΩ
output level	77mV (–20dB)	0.44V (–5dB)

Tape Speed Adjustment

Procedure:

Mode: playback

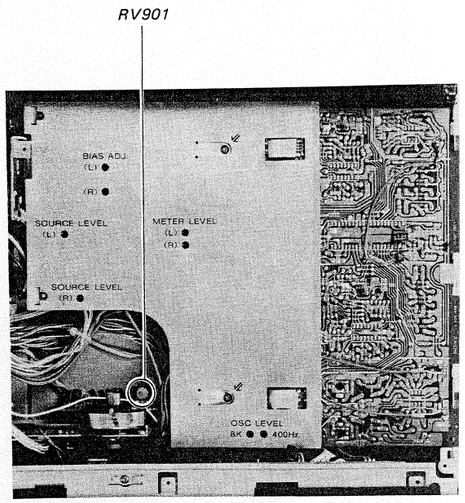


Specification:

Speed checker	Digital frequency counter
–0.17 to +0.17%	2,995 – 3,005Hz

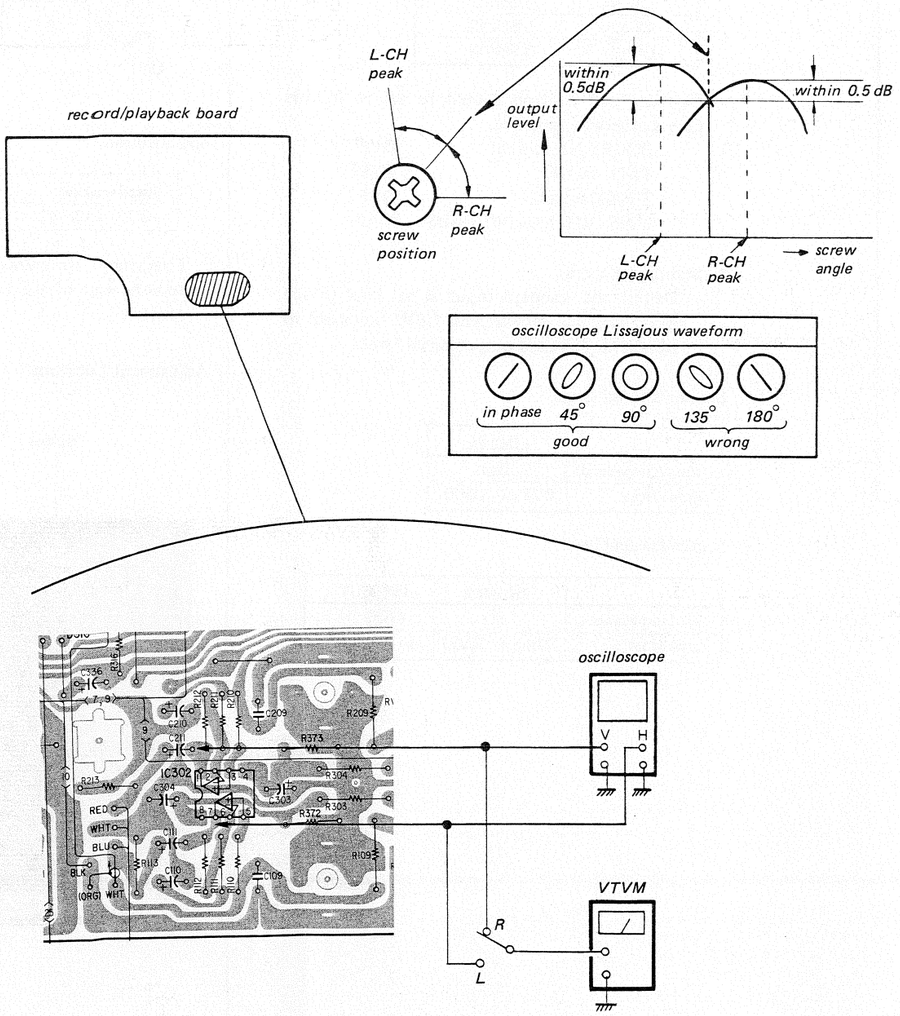
Frequency difference between the beginning and the end of the tape should be within 0.34% (10Hz).

Adjustment Location:



Record/Playback Head Vertical Adjustment

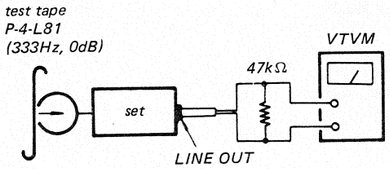
1. Apply a 10kHz, −30dB (24mV) signal to LINE IN jack.
2. Set for record mode.
3. Turn the screw to adjust for maximum output. When L and R peaks do not match, adjust the screw to the point where they match within 1dB.
4. Confirm that L, R outputs are in phase.
5. If they are not, adjust by turning the screw. At this time the L, R outputs should be within 0.5dB of maximum. If they are not, return the screw to R output maximum position, and make sure L, R phase is within 90°.
6. Lock the screw.



Playback Level Adjustment

Procedure:

Mode: playback



Specification:

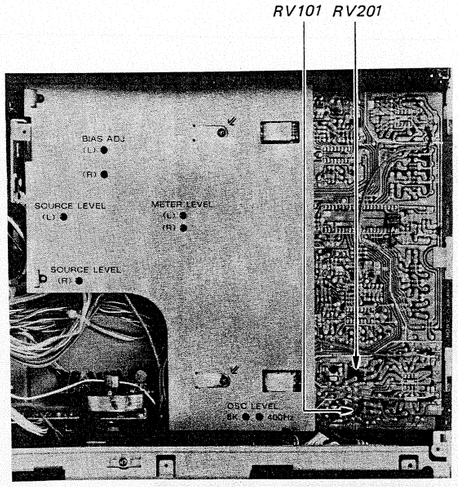
LINE OUT level: 0.52 – 0.59V
(−3.5 to −2.5dB)

Level difference between channels:
less than 0.5dB

Check that the LINE OUT level does not change in playback mode while changing the mode from playback to stop several times.

Adjustment Location:

– record/playback board –

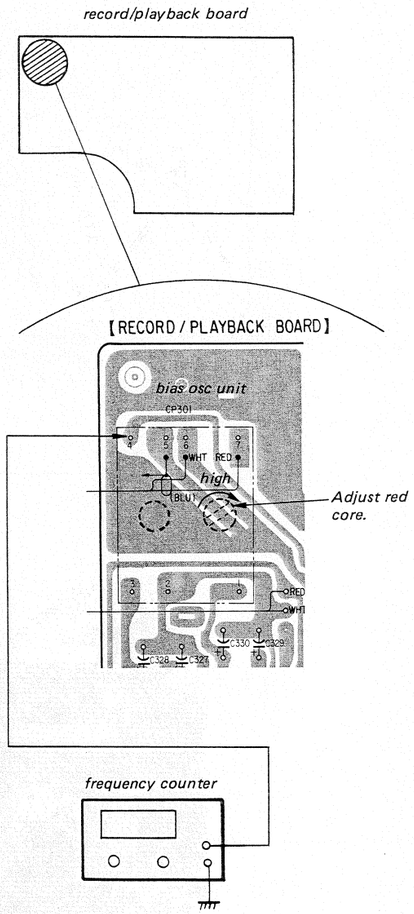


larger

Bias Osc Frequency Adjustment

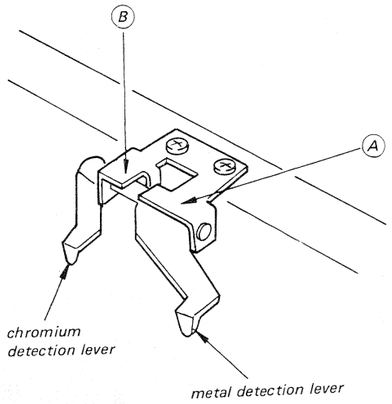
1. Connect the frequency counter as shown below.
2. Insert a cassette tape and set for record mode.
3. Adjust the red core of bias osc unit to obtain specified frequency.

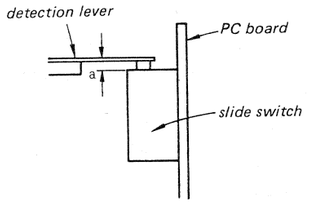
Specifications: 103 – 107kHz

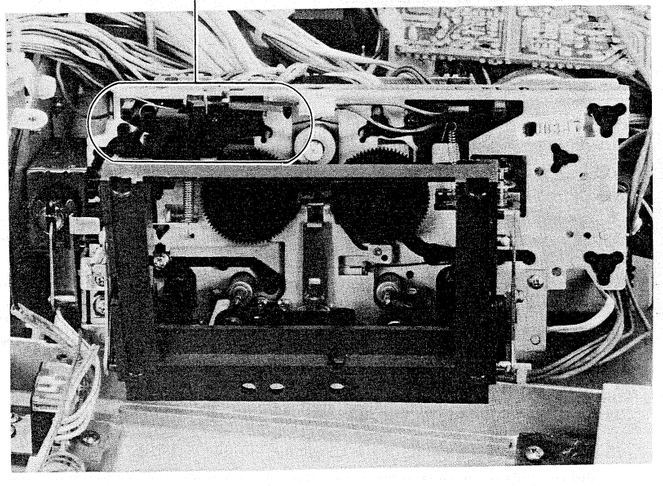


Detection Lever Adjustment

1. Insert a normal type tape.
2. Bend (A) to adjust so that the clearance "a" between the metal detection lever and slide switch is 0 – 0.1mm (0 – 1/32"). (Do not push too far.)
3. Next, bend (B) up and down to adjust so that the clearance "a" between the chromium detection lever and slide switch is 0 – 0.1mm (0 – 1/32"). (Do not bend too far.)







3-2. ELECTRICAL ADJUSTMENTS

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- Set the TAPE switches according to the tape as follows.

Tape	TAPE switch
CS-15	TYPE I
CS-20	TYPE II
CS-30	TYPE III
CS-40	TYPE IV

- Switches and controls should be set as follows unless otherwise specified.
  - DOLBY NR switch: OFF
  - TAPE switch: TYPE I
  - TIMER switch: OFF
  - LINE OUT/HEADPHONES: MAX
- Standard Record:
  Deliver the standard input signal level to the input jack and set the REC LEVEL control to obtain the standard output signal level.

Standard Input Level

	LINE IN
source impedance	10kΩ
input level	0.25V (–10dB)

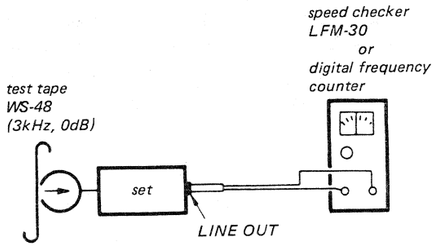
Standard Output Level

	PHONES	LINE OUT
load impedance	8Ω	47kΩ
output level	77mV (–20dB)	0.44V (–5dB)

Tape Speed Adjustment

Procedure:

Mode: playback

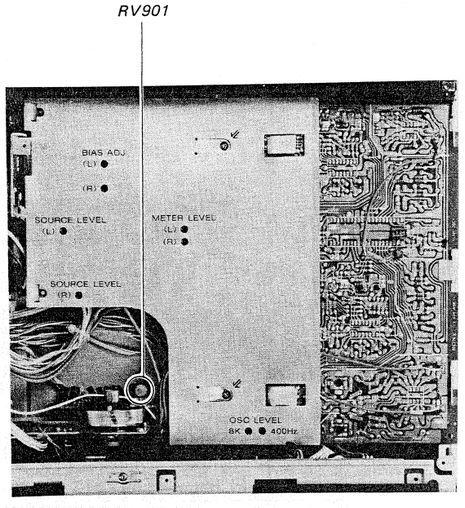


Specification:

Speed checker	Digital frequency counter
–0.17 to +0.17%	2,995 – 3,005Hz

Frequency difference between the beginning and the end of the tape should be within 0.34% (10Hz).

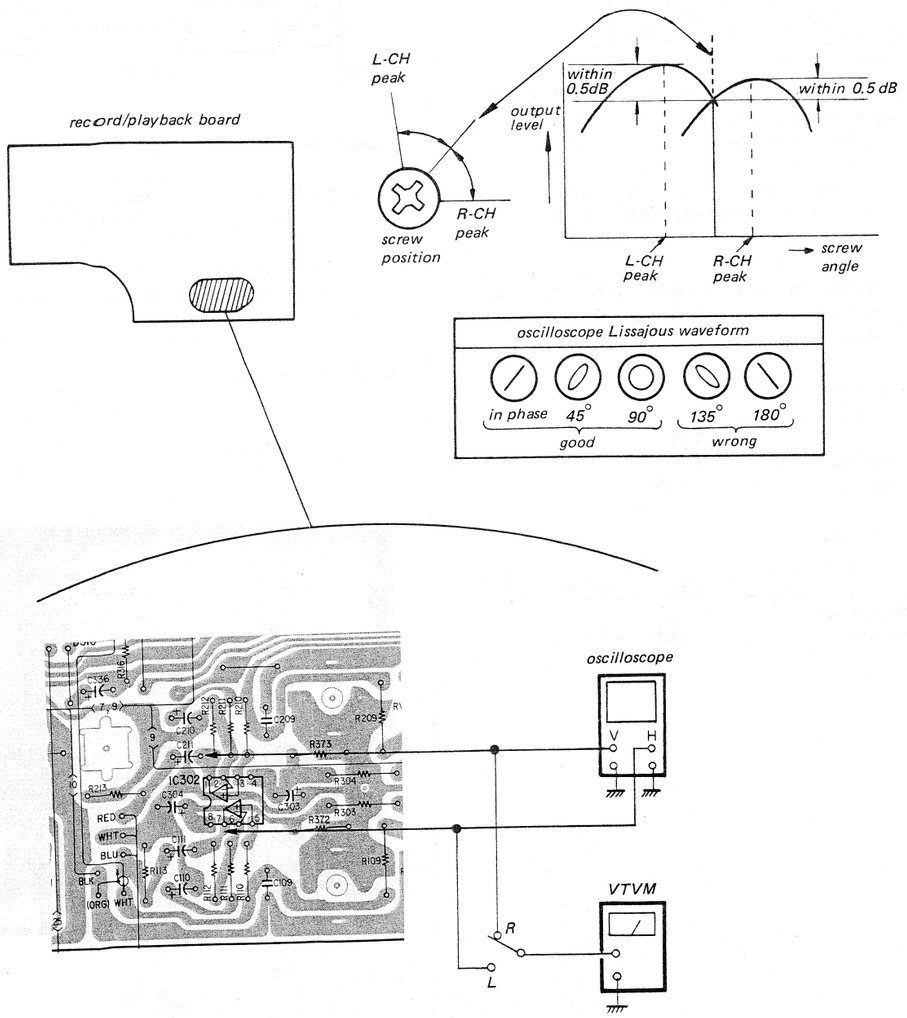
Adjustment Location:



fast

Record/Playback Head Vertical Adjustment

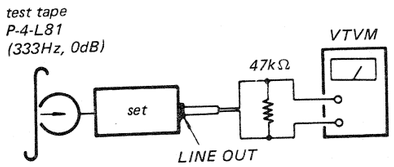
1. Apply a 10kHz, −30dB (24mV) signal to LINE IN jack.
2. Set for record mode.
3. Turn the screw to adjust for maximum output. When L and R peaks do not match, adjust the screw to the point where they match within 1dB.
4. Confirm that L, R outputs are in phase.
5. If they are not, adjust by turning the screw. At this time the L, R outputs should be within 0.5dB of maximum. If they are not, return the screw to R output maximum position, and make sure L, R phase is within 90°.
6. Lock the screw.



Playback Level Adjustment

Procedure:

Mode: playback



Specification:

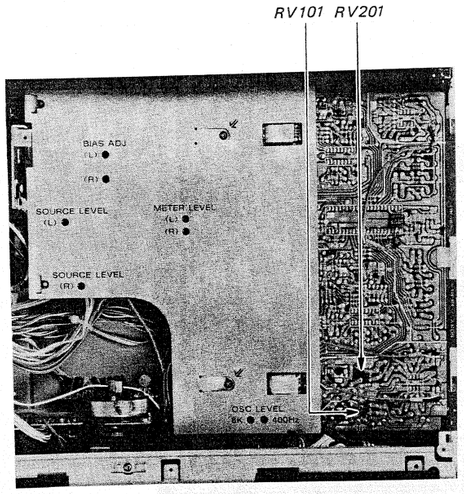
LINE OUT level: 0.52 – 0.59V
(−3.5 to −2.5dB)

Level difference between channels:
less than 0.5dB

Check that the LINE OUT level does not change in playback mode while changing the mode from playback to stop several times.

Adjustment Location:

– record/playback board –

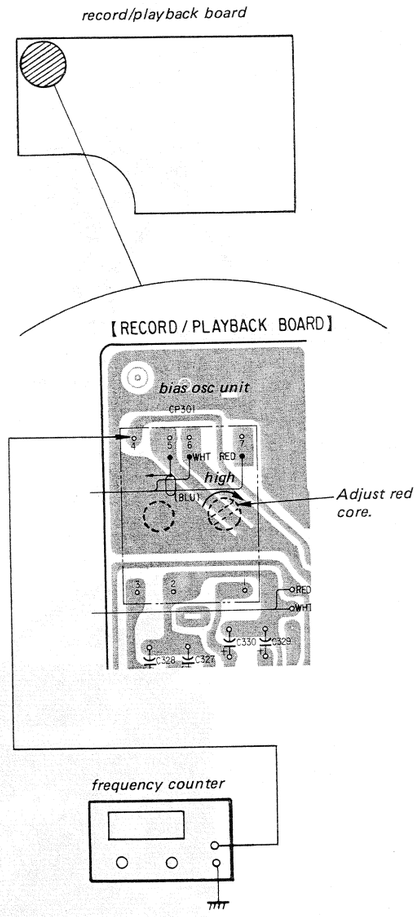


larger

Bias Osc Frequency Adjustment

1. Connect the frequency counter as shown below.
2. Insert a cassette tape and set for record mode.
3. Adjust the red core of bias osc unit to obtain specified frequency.

Specifications: 103 – 107kHz



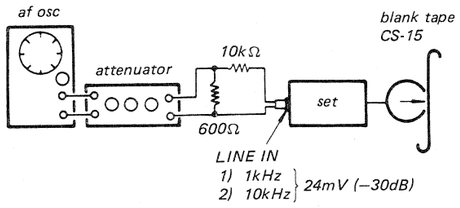
Record Bias Adjustment

Setting:

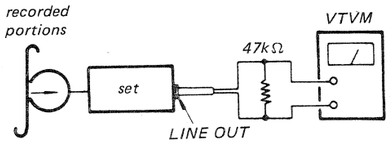
REC LEVEL control: standard record (See page 32)

Procedure:

1. Mode: record



2. Mode: playback

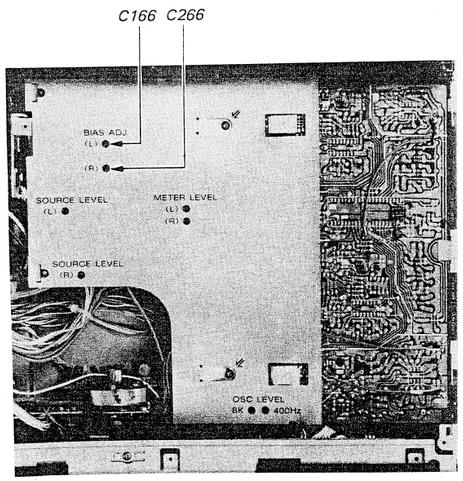


Adjust C166 (L-CH) and C266 (R-CH) so that the LINE OUT level of 333Hz signal is 0dB relative to that of 10kHz.

Specification: 0dB ±0.3dB

Adjustment Location:

— record/playback board —



raises 10kHz

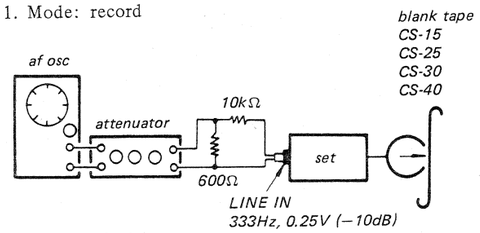
Record Level Adjustment

Setting:

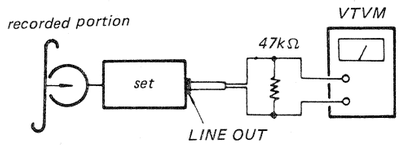
REC LEVEL control: standard record (See page 32)

Procedure:

1. Mode: record



2. Mode: playback

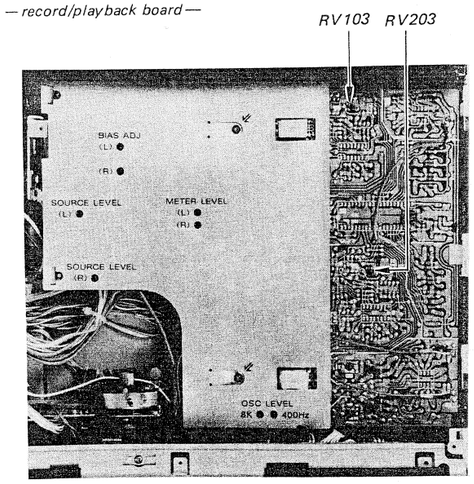


Specification:

Tape	LINE OUT level
CS-15	0.41 – 0.46V (−5.5 to −4.5dB)
CS-25 CS-30 CS-40	0.37 – 0.46V (−6.5 to −4.5dB)

Adjustment Location.

— record/playback board —



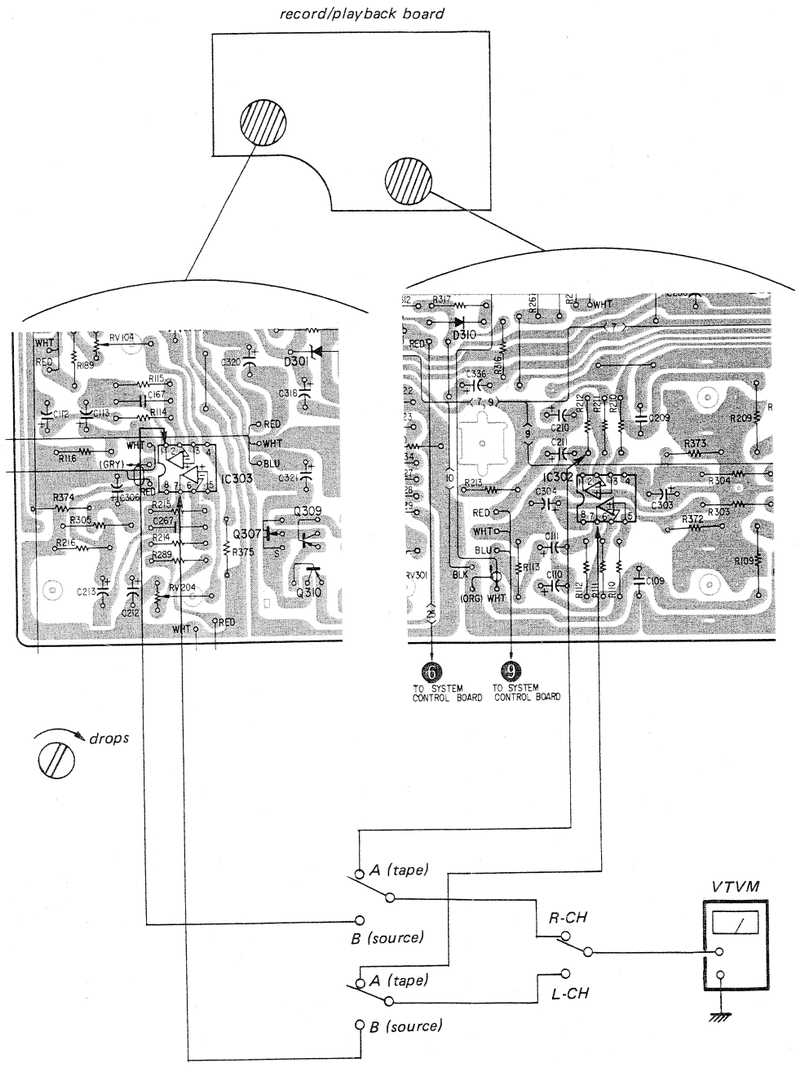
drops

Source Monitor Level Adjustment

REC LEVEL control: standard record (See page 32)

1. Apply 333Hz, −30dB (24mV) to LINE IN.
2. Set for record mode.
3. Adjust RV104 (L-CH) and RV204 (R-CH) so that the levels of check points A and B are the same.

Specification: 0 dB ± 0.1 dB



CAL Oscillator Adjustment

Remove pattern bridge at Ⓐ .

400Hz oscillation level adjustment

Adjust RV301 for 11.0dB (2.74V) output level.

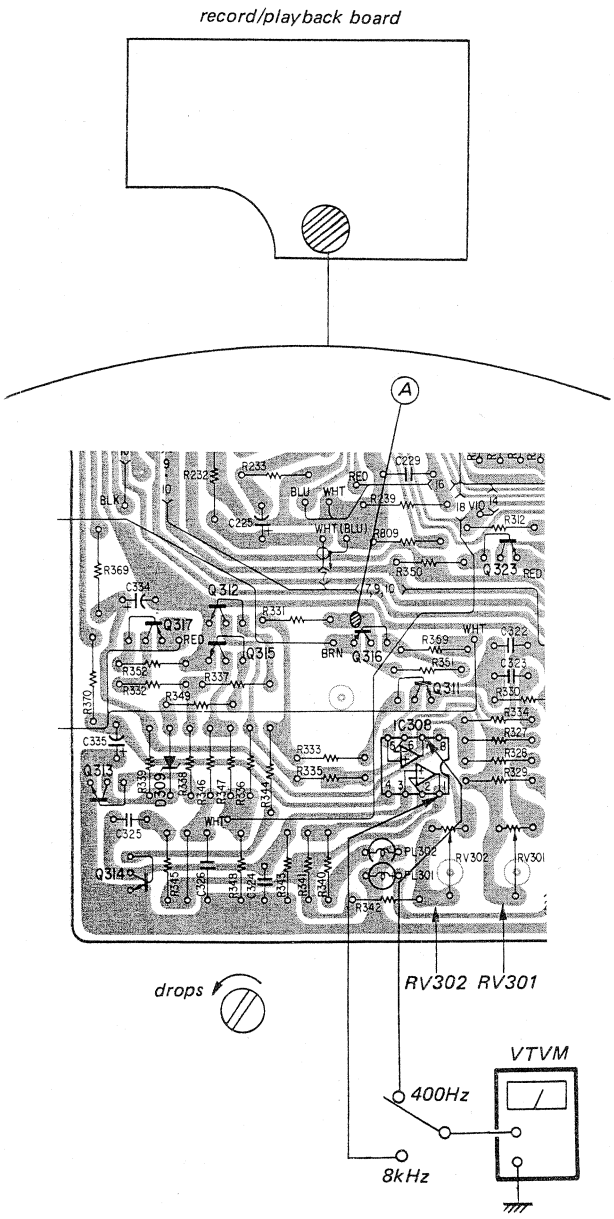
Specification: 10.9 – 11.1dB (2.71V – 2.78V)

8kHz oscillation level adjustment

Adjust RV302 for 10.5dB (2.59V) output level.

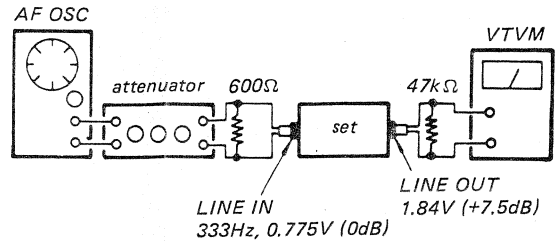
Specification: 10.4 – 10.6dB (2.56 – 2.62V)

After adjustment, bridge Ⓐ .



Level Meter Adjustment

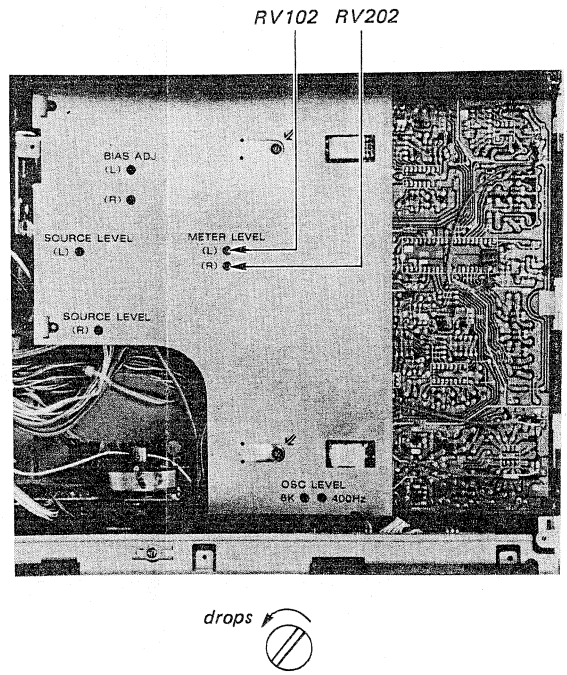
Mode: record

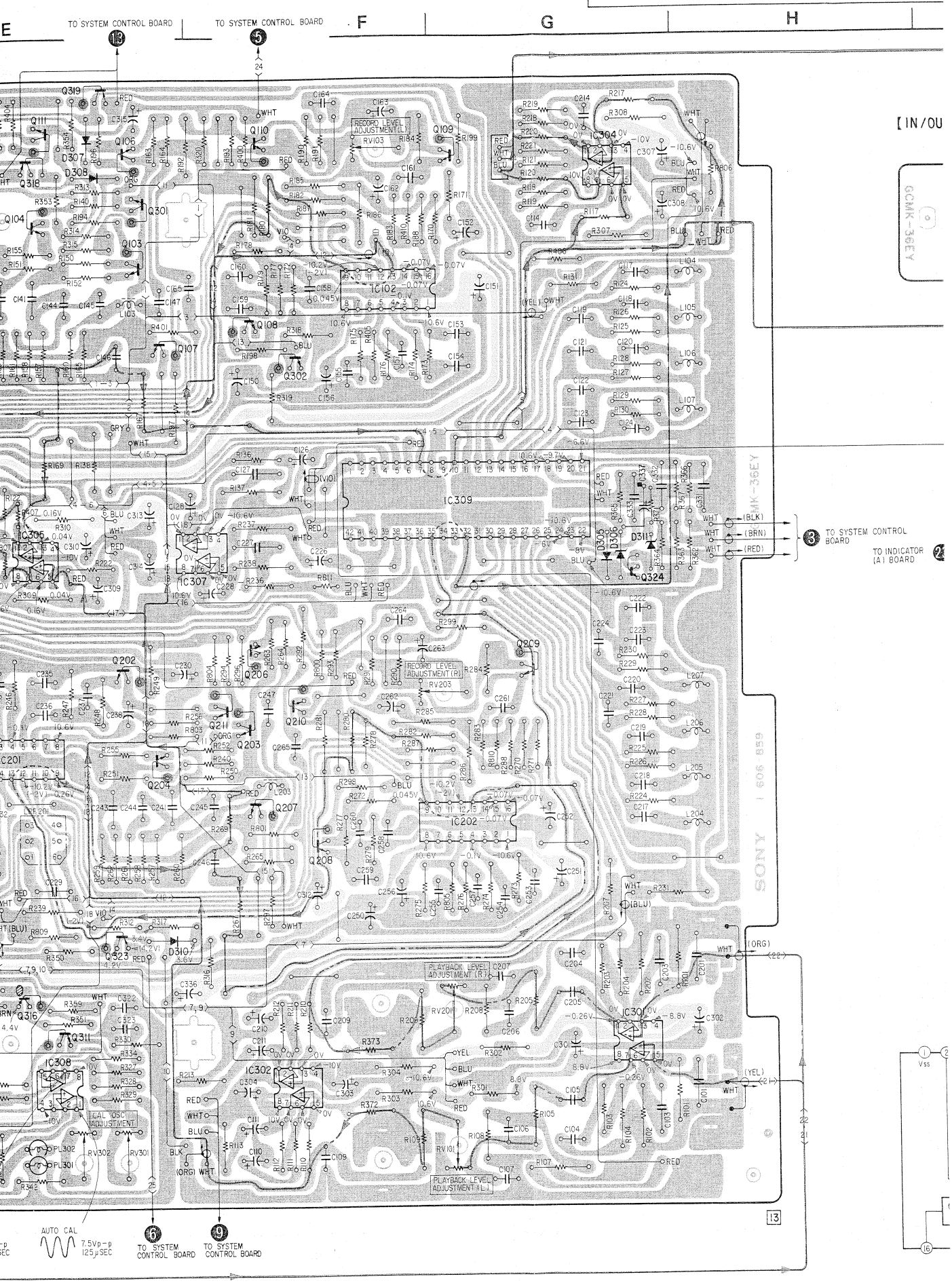


1. Set REC LEVEL for +7.5dB LINE OUT level.
2. Adjust variable RV102, 202 so that the LED meter 8dB (right side) lights up.
3. Set REC LEVEL for −5dB LINE OUT, and confirm that LED meter indication is −4dB (0VU) at this time.
   – Perform the adjustment by raising from low level. (Be careful of peak hold.)

Adjustment Location:

– record/playback board –




TO SYSTEM CONTROL BOARD
TO SYSTEM CONTROL BOARD
E
F
G
H
[IN/OU
GCMK-36EY
IC309
IC304
IC307
IC306
IC308
IC302
IC301
IC202
IC102
Q319
Q318
Q111
Q106
Q110
Q109
Q104
Q301
Q103
Q108
Q107
Q302
Q202
Q206
Q211
Q210
Q203
Q204
Q207
Q208
Q209
Q324
Q323
Q316
Q311
D307
D308
D310
D311
D305
D306
RECORD LEVEL ADJUSTMENT (L)
RECORD LEVEL ADJUSTMENT (R)
PLAYBACK LEVEL ADJUSTMENT (R)
PLAYBACK LEVEL ADJUSTMENT (L)
CAL OSC ADJUSTMENT
RV103
RV203
RV201
RV101
RV302
RV301
PL302
PL301
TO SYSTEM CONTROL BOARD
TO INDICATOR (A) BOARD
(BLK)
(BRN)
(RED)
(ORG)
(YEL)
(BLU)
AUTO CAL
7.5Vp-p
125μSEC
SONY 1 606 859

4-1. MOUNTING DIAGRAM —record/playback section —

Refer to page 58 for semiconductor lead layouts.

【RECORD / PLAYBACK BOARD】

【IN/OU

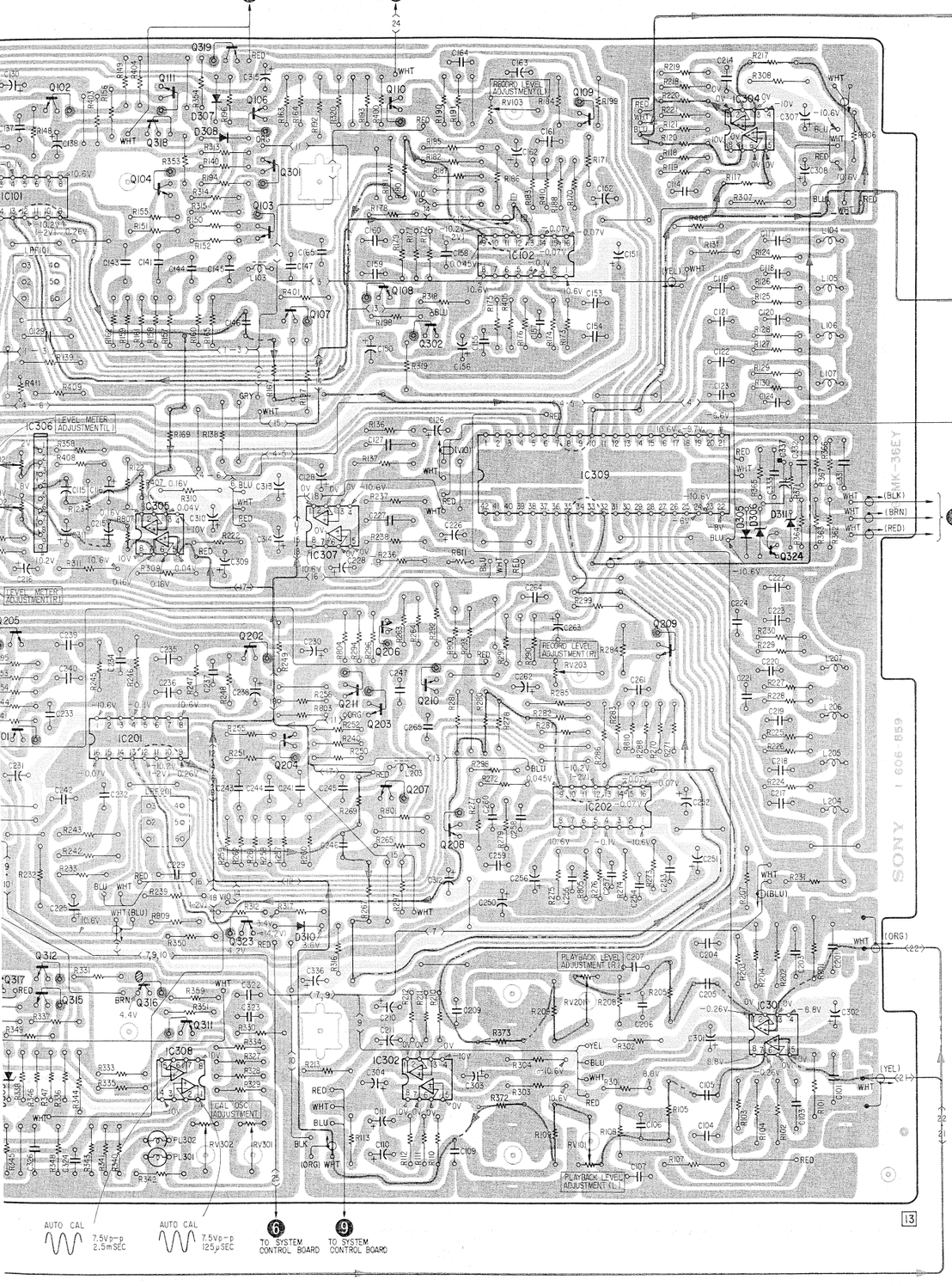
Q , IC	D
319	
105,102,111	
110,109	307
106	
318	308
101 IC304	
301	
104	
IC101	
103	
IC102	
108	
107	
302	303,304
320,321	
304	
303,305	
322	
306	
IC309	301
IC306	
IC307	
IC305 324	311 305,306
IC303	
307,309,308	302
205,206	
202 209	
310 211,210	
203	
201	
IC201	
204	
207	
IC202	
208	
323	310
312	
317,316	
315	
311	
IC301	
IC308,IC302	309
313	
314	
Q , IC	D

E F G H I J K

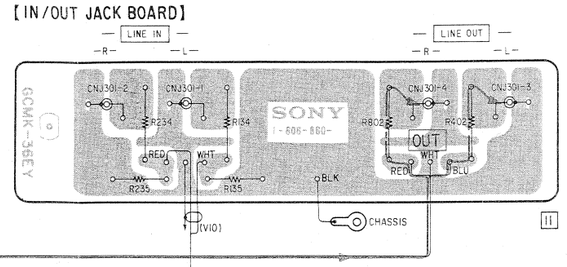
1 2 3 4 5

TO SYSTEM CONTROL BOARD (13)

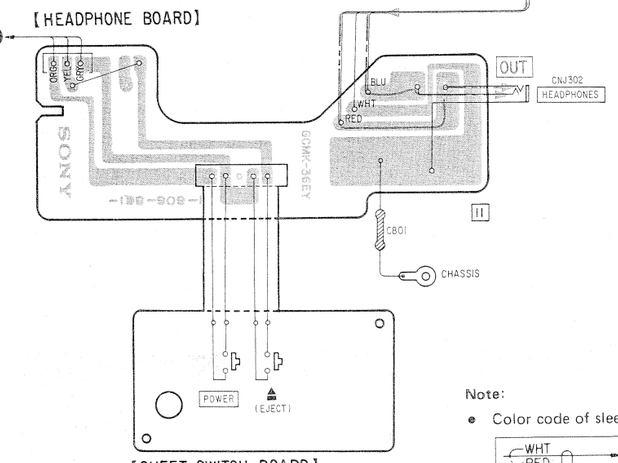
TO SYSTEM CONTROL BOARD (5)



【IN/OUT JACK BOARD】



【HEADPHONE BOARD】

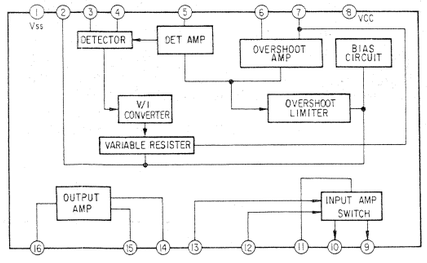


【SHEET SWITCH BOARD】

TO SYSTEM CONTROL BOARD (3) (BLK) (BRN) (RED)

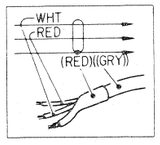
TO INDICATOR (A) BOARD (23)

IC101,102,201,202
CX174



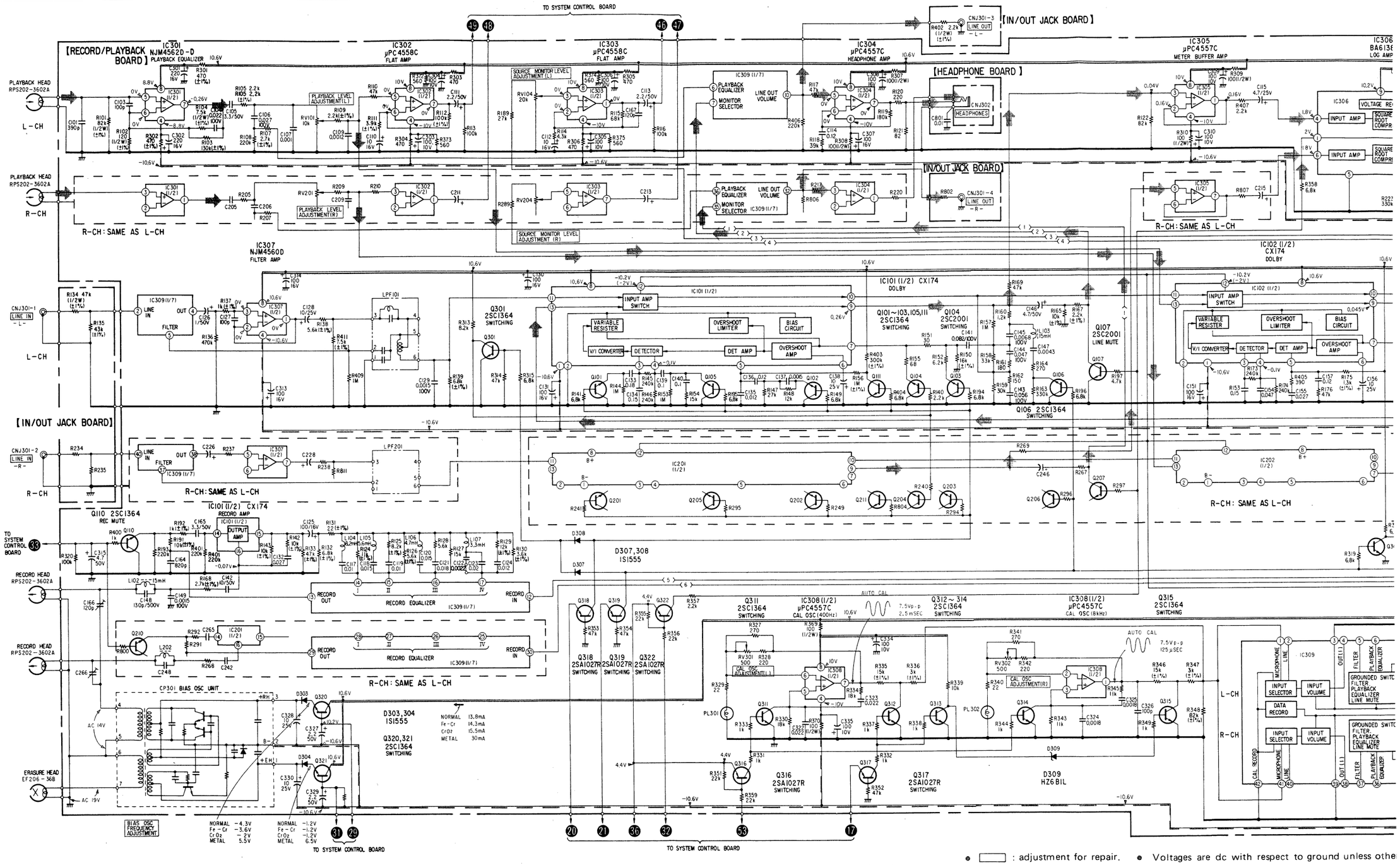
Note:

- Color code of sleeving over the end of the jacket.



- ■ : part mounted on the conductor side.
- ▲ : nonflammable resistor.
- Ⓕ : fusible resistor.
- : B + pattern
- : B − pattern
- : signal path
- : L-CH signal path
- : R-CH signal path

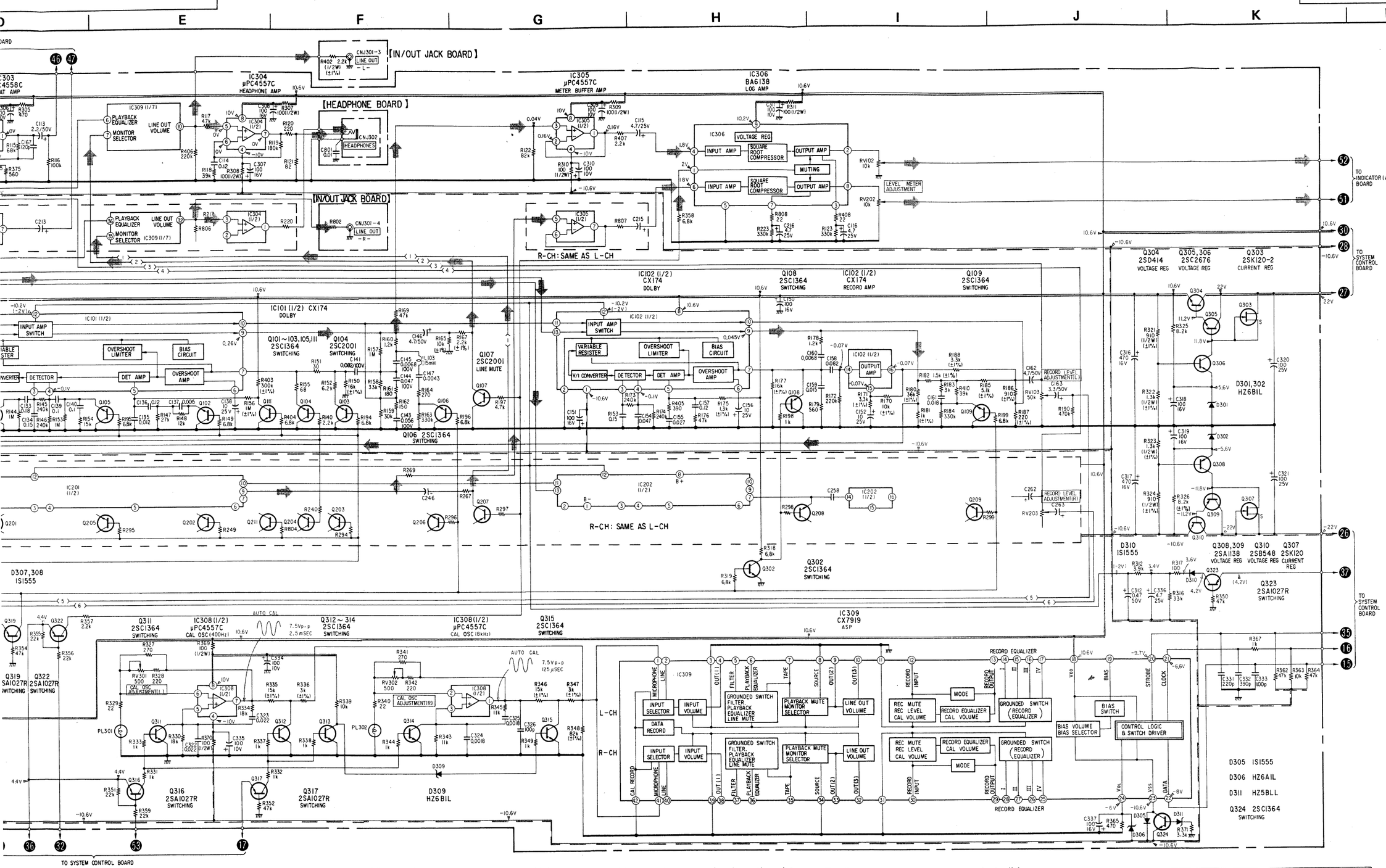
4-2. SCHEMATIC DIAGRAM — record/playback section —



Note:

- Components for right channel have same values as for left channel. Reference numbers are coded from 200 to 299.
- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- : fusible resistor.
- : panel designation.
- : adjustment for repair.
- : B+ bus.
- : B- bus.
- : signal path
- Voltages are dc with respect to ground unless othe noted.
- Voltage variations may be noted due to normal pr tion tolerances.

TC-FX1010



- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- : fusible resistor.
- : panel designation.
- : adjustment for repair.
- : B+ bus.
- : B- bus.
- : signal path

- Voltages are dc with respect to ground unless otherwise noted.
- Voltage variations may be noted due to normal production tolerances.

- Readings are taken under no-signal conditions.
  ( ) : recording mode
  no mark : playback mode

Note: Voltages are measured with a VOM (50kΩ/V).

Q , IC	D
IC902 IC901 903,904 901,902	901

M2
CAPSTAN MOTOR

BSL MOTOR
STATOR

【SERVO BOARD】
(COMPONENT SIDE)

TAPE SPEED ADJUSTMENT

IC901
CX069A

COMPARATOR AMP

T701
POWER TRANSFORMER

T702
POWER TRANSFORMER

AEP,UK E,MODEL

【FUSE BOARD】

【RELAY BOARD】

AC IN

RY701

AC OUTLET

US,CANADIAN MODEL

NOTE ON REPLACING TRNSFORMER OF AEP,UK MODEL:
POWER TRANSFORMER OF AEP,UK MODEL IS COMMON. WHEN REPLACING THE TRANSFORMER, BE CAREFUL NOT TO SHORT THE RED LEAD IN CASE OF AEP MODEL AND THE VIOLET LEAD IN CASE OF UK MODEL.

	※1,2	※3
US, CANADIAN MODEL	○	×
AEP,UK,E MODEL	×	○

TO INDICATOR (A) BOARD ⑭ ⑮
TO INDICATOR (B) BOARD ⑯
TO RECORD/PLAYBACK BOARD ④ ⑤ ⑥
TO RECORD/ PLAYBACK BOARD ⑬
TO INDICATOR (A) BOARD ⑰
【TRANSISTOR (A) BOARD】
TO INDICATOR (B) BOARD ⑲
TO INDICATOR (A) BOARD ⑱
TO RECORD/PLAYBACK BOARD ⑦
TO RECORD/PLAYBACK BOARD ⑧ ⑨
TO INDICATOR (A) BOARD ⑳
TO RECORD/PLAYBACK BOARD ⑫

【SYSTEM CONTROL BOARD】

SONY
1-606-862-13 10V
SCMK-36EY

Q776 – 781, Q738
TO VOLTAGE ON : 0.6V
TO VOLTAGE OFF : -1.3V

POWER OFF 11.6V
POWER ON 9.6V

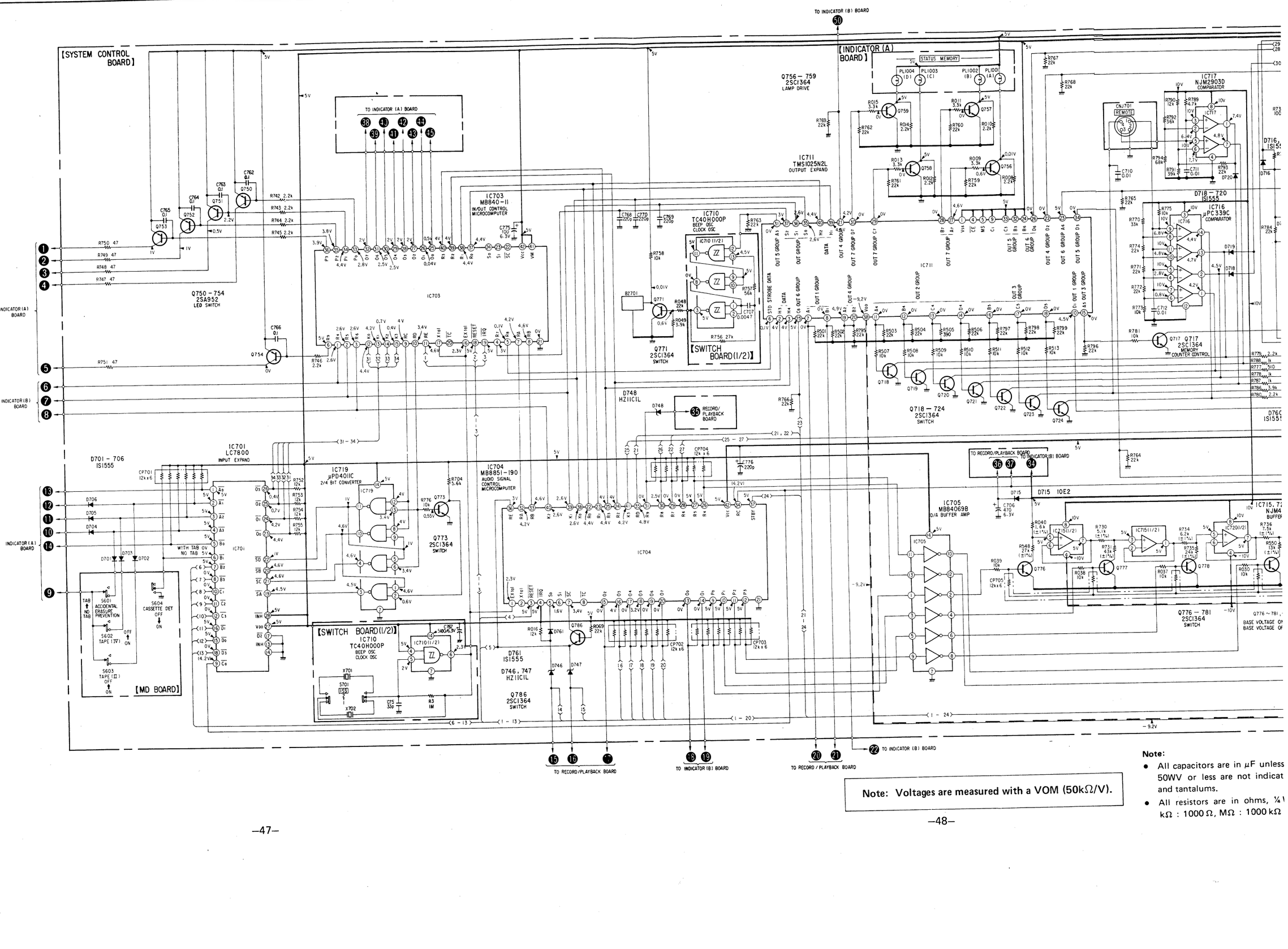
US, CANADIAN MODEL ONLY

WITH TAB 0V
NO TAB 5V

Q	IC716, IC717, 724, 719, 723, 722, 718, 717, 721, 720, 745, 744, 741, 731, 740, 735, IC711, 733, 732, 754,751, 750,752,753, 782, 748, IC712, 756,758, 757,759, IC710, 749, 772, 725,729, 771, IC714, 727,728, IC713, 730,726, IC718, IC703, IC722, 701,702,709, 738,716, 736, 739,737, 775, 710,711,712, IC701, 742, IC719, 773, 743, IC704, 786, 781, 714, 780, 779, IC705, IC715, IC721, IC720, 777, 776, 713, 715, 774, 755, IC707, 760, IC702, IC709, 707, 703,70, 762, 764, IC708, 763, 784, 778, IC706, 770,769,
D	739,740, 743, 720, 738, 744, 724, 736, 737, 740, 733,725, 729,727,726,728, 753,723, 732,722, 721, 731, 730, 734, 754, 719,718, 760, 706, 702, 705, 715, 704, 703,701, 735,711, 708, 709,707, 710, 756, 713, 716,717, 755, 745, 747,748, 761, 746,752, 749, 751,

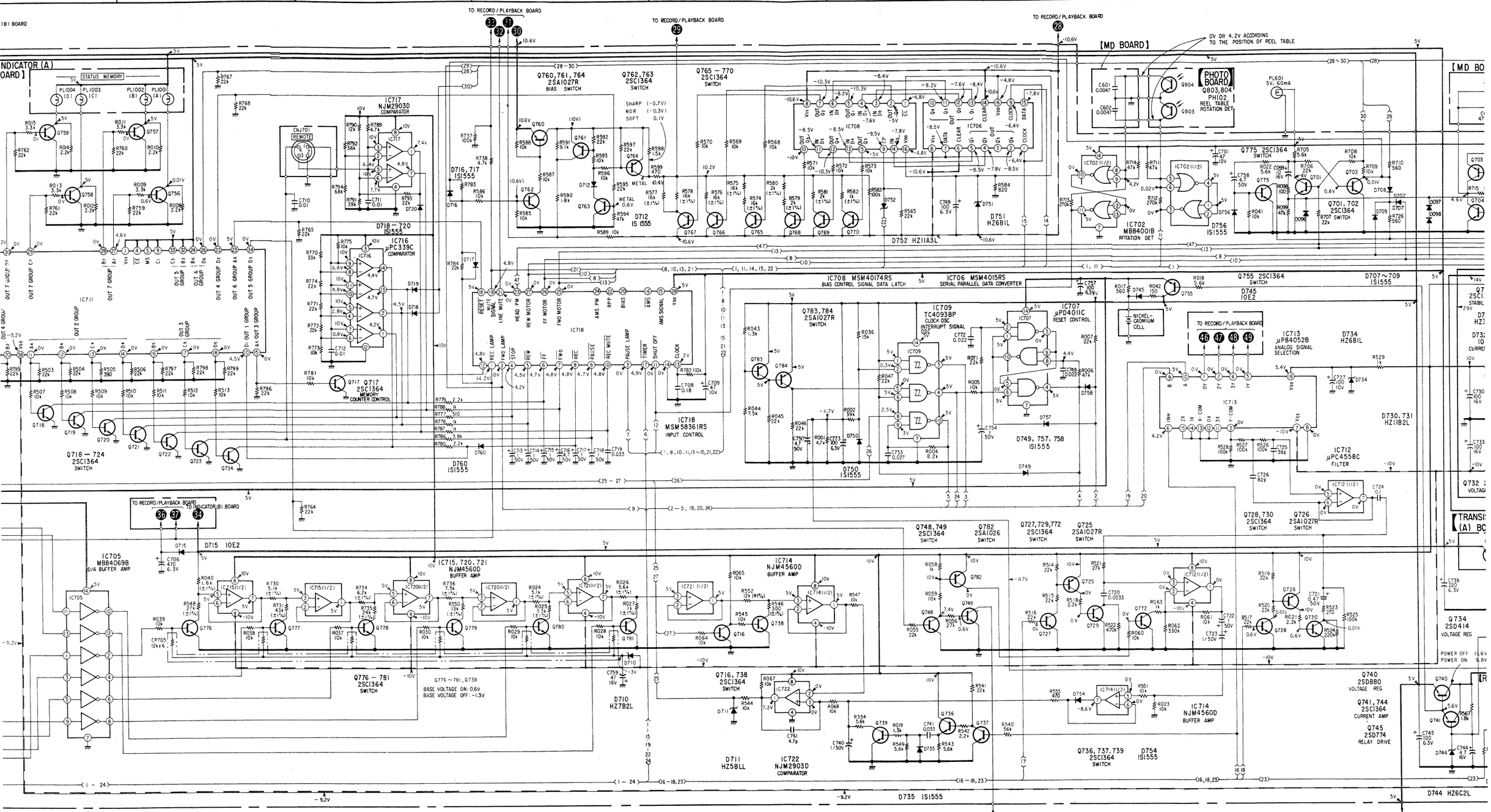
● See page 57 for E model.

4-4. SCHEMATIC DIAGRAM — system control section —



Note:

- All capacitors are in μF unless 50WV or less are not indicat and tantalums.
- All resistors are in ohms, ¼ kΩ : 1000 Ω, MΩ : 1000 kΩ



Note: Voltages are measured with a VOM (50kΩ/V).

Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ

- : nonflammable resistor.
- : fusible resistor.
- : panel designation.

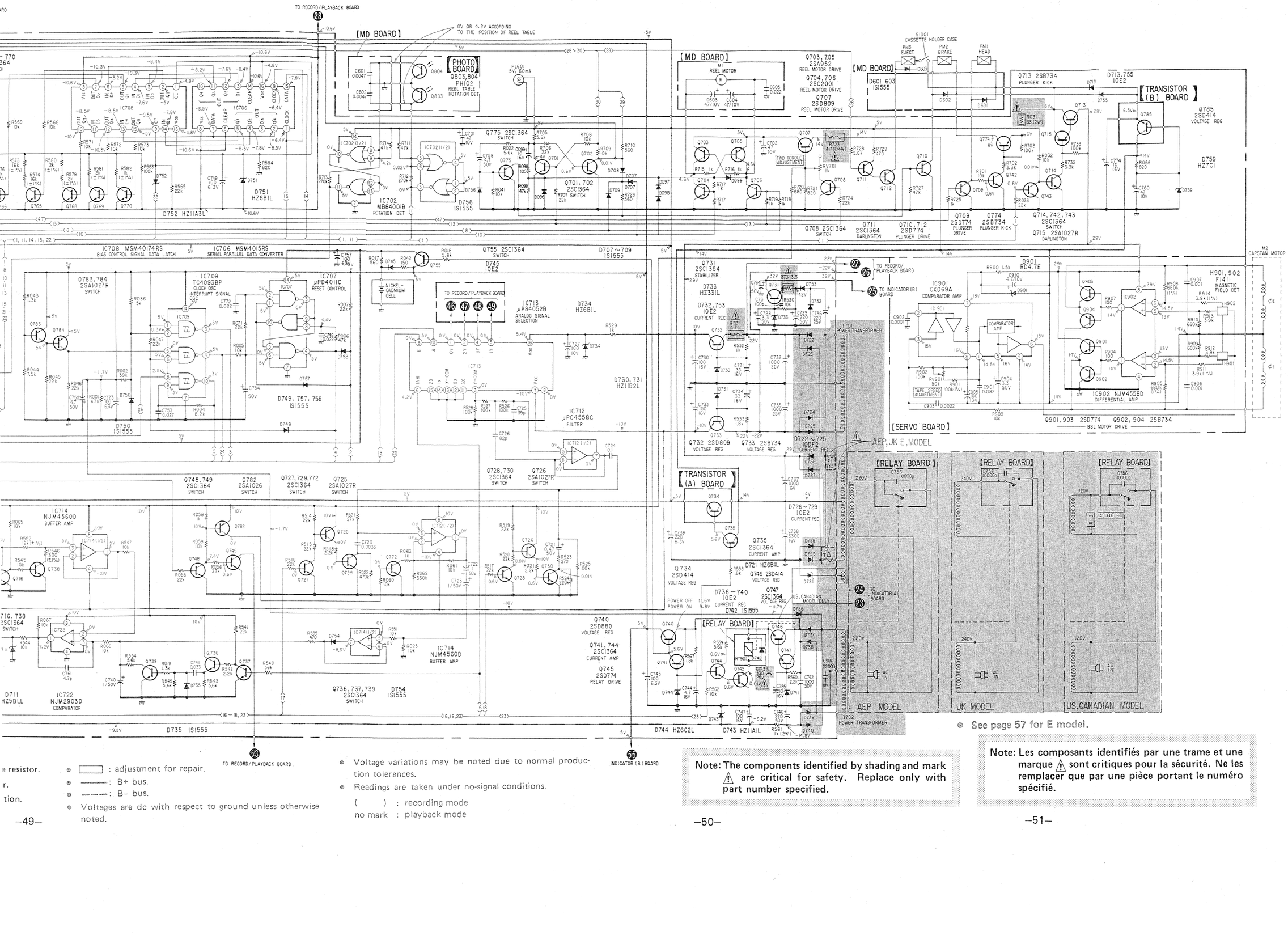
- : adjustment for repair.
- ——: B+ bus.
- – – –: B– bus.
- Voltages are dc with respect to ground unless otherwise noted.

- Voltage variations may be noted due to normal production tolerances.
- Readings are taken under no-signal conditions.

( ) : recording mode
no mark : playback mode

J K L M N O P Q R

1 2 3 4 5



See page 57 for E model.

e resistor.
r.
tion.

: adjustment for repair.
: B+ bus.
: B- bus.

- Voltages are dc with respect to ground unless otherwise noted.
- Voltage variations may be noted due to normal production tolerances.
- Readings are taken under no-signal conditions.

( ) : recording mode
no mark : playback mode

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

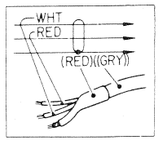
TC-FX1010 TC-FX1010

4-5. MOUNTING DIAGRAM — display section —

Refer to page 57 for semiconductor lead layouts.

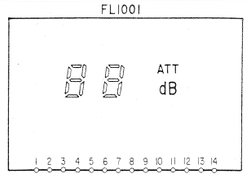
Note:

- Color code of sleeving over the end of the jacket.

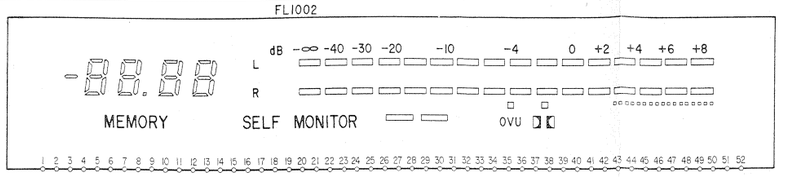


- ■ : part mounted on the conductor side.
- Ⓕ : fusible resistor.
- ▲ : nonflammable resistor.
- ▒ : B+ pattern
- ⟹ : signal path
- ⟹ : L-CH signal path
- ⟹ : R-CH signal path

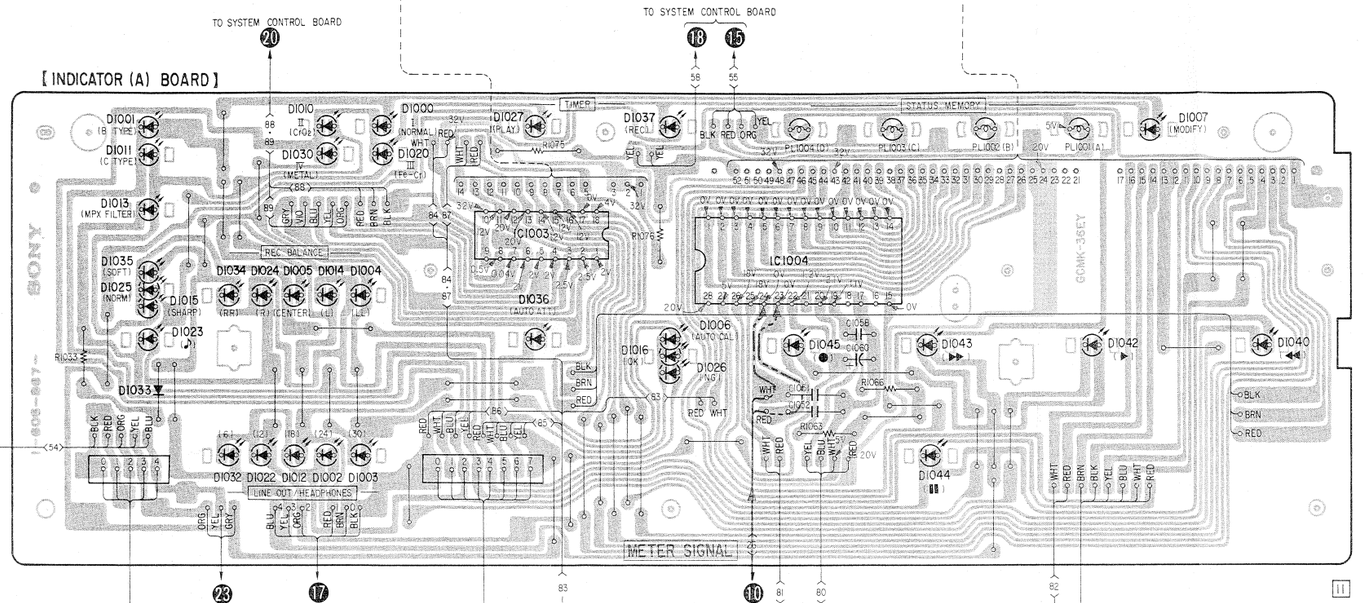
FL1001



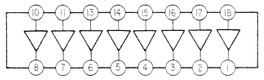
FL1002



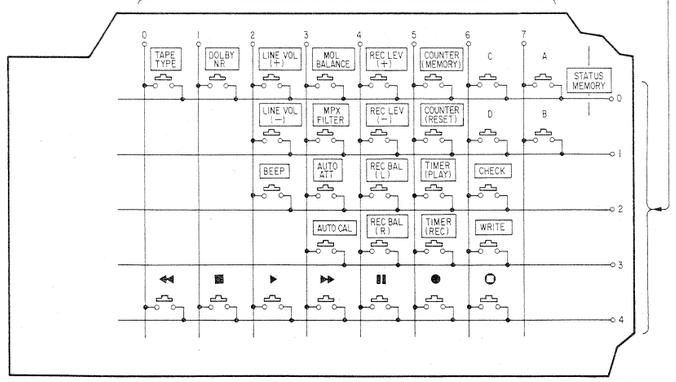
【INDICATOR (A) BOARD】



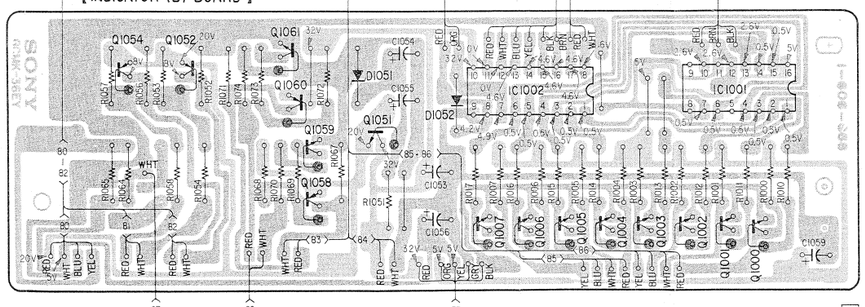
IC1002, 1003
MSL912



【SHEET SWITCH BOARD】

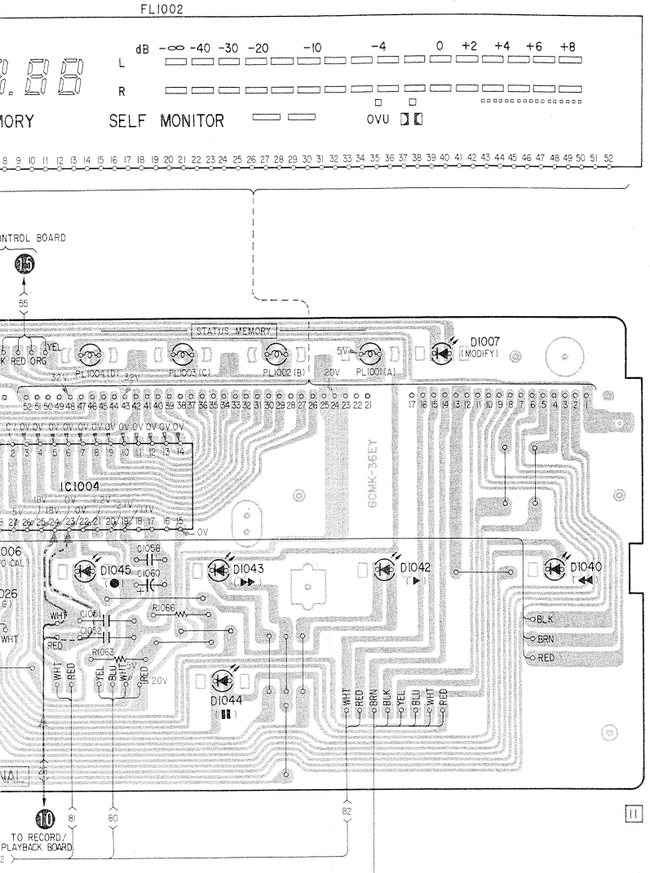


【INDICATOR (B) BOARD】



Q , IC	D
IC1003	1027, 1037
IC1004	1001, 1010, 1000
	1011, 1030, 1020
	1013
	1035
	1025
	1034, 1024, 1005, 101
	1015
	1036, 1006
	1023 1045, 1043
	1016
	1026
	1033
	1032, 1022, 1012, 100

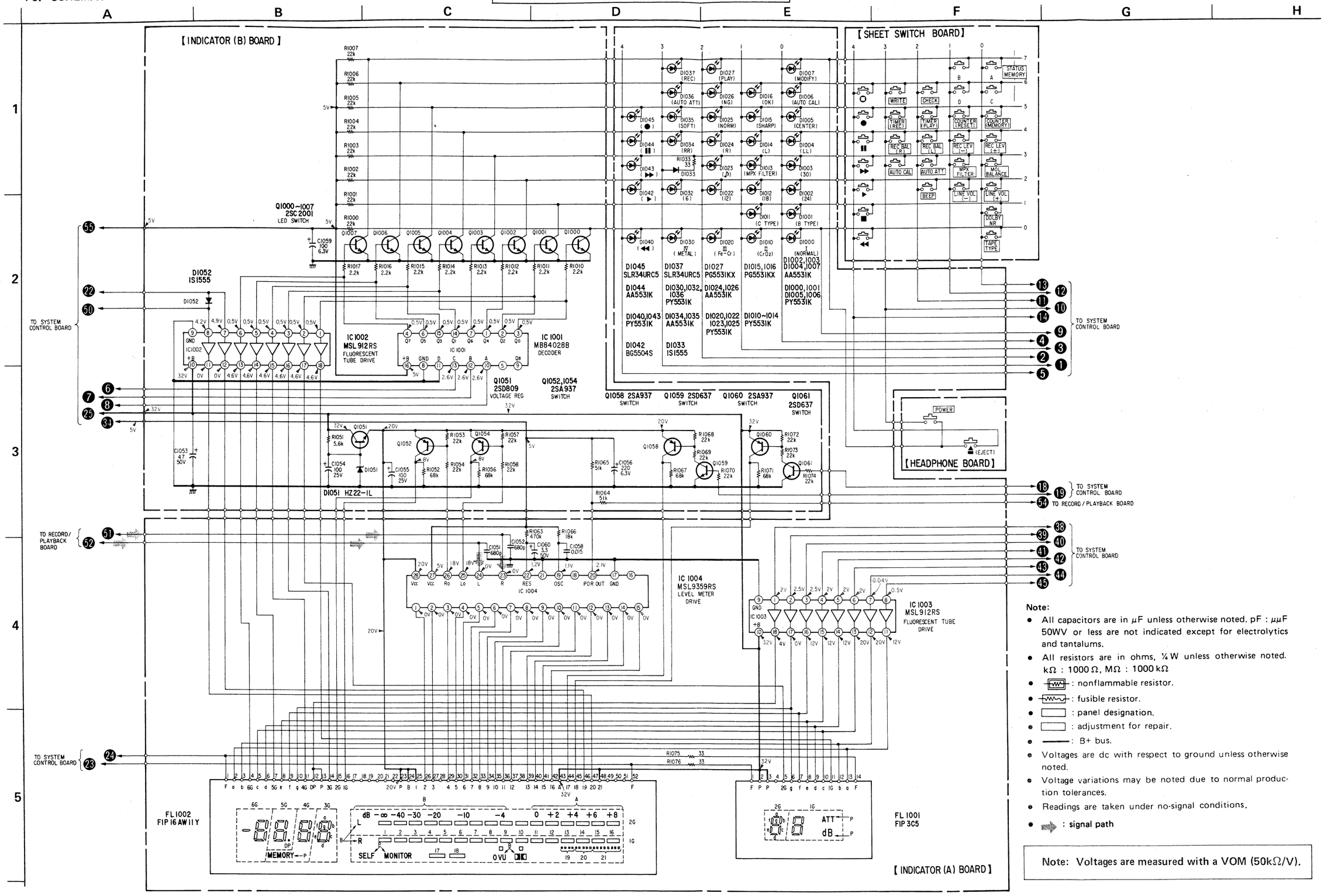
Q , IC	D
	1061
	1054, 1052
	IC1002, IC1001 IC
	1060
	1051
	1059
	1058
	1007, 1006, 1005, 1004
	1003, 1002, 1001, 1000



Q , IC	D
	1027, 1037 1007
	1001, 1010, 1000
	1011, 1030, 1020
	1013
IC1003	
IC1004	1035
	1025
	1034, 1024, 1005, 1014, 1004
	1015
	1036, 1006
	1023 1045, 1043, 1042, 1040
	1016
	1026
	1033
	1032, 1022, 1012, 1002, 1003
	1044
	1061
	1054, 1052 1051
	IC1002, IC1001 1052
	1060
	1051
	1059
	1058
	1007, 1006, 1005, 1004
	1003, 1002, 1001, 1000
Q , IC	D

4-6. SCHEMATIC DIAGRAM — display section —

4-6. SCHEMATIC DIAGRAM — display section —



Note:

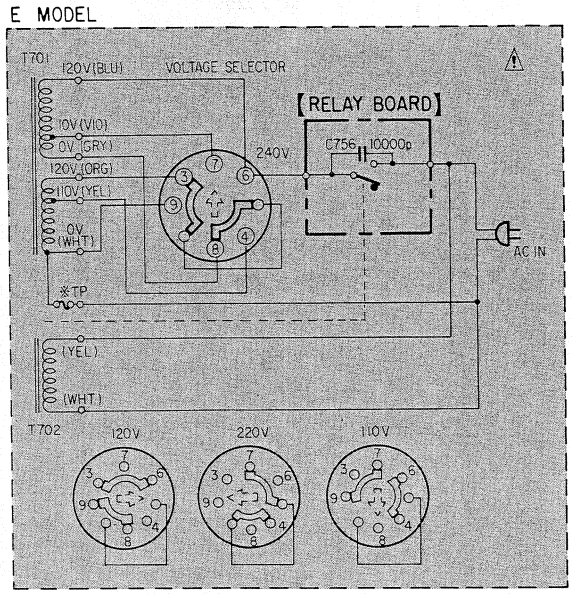
- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- : fusible resistor.
- : panel designation.
- : adjustment for repair.
- : B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Voltage variations may be noted due to normal production tolerances.
- Readings are taken under no-signal conditions.
- : signal path

Note: Voltages are measured with a VOM (50kΩ/V).

4-7. SCHEMATIC DIAGRAM

– Power Supply Section (E model)

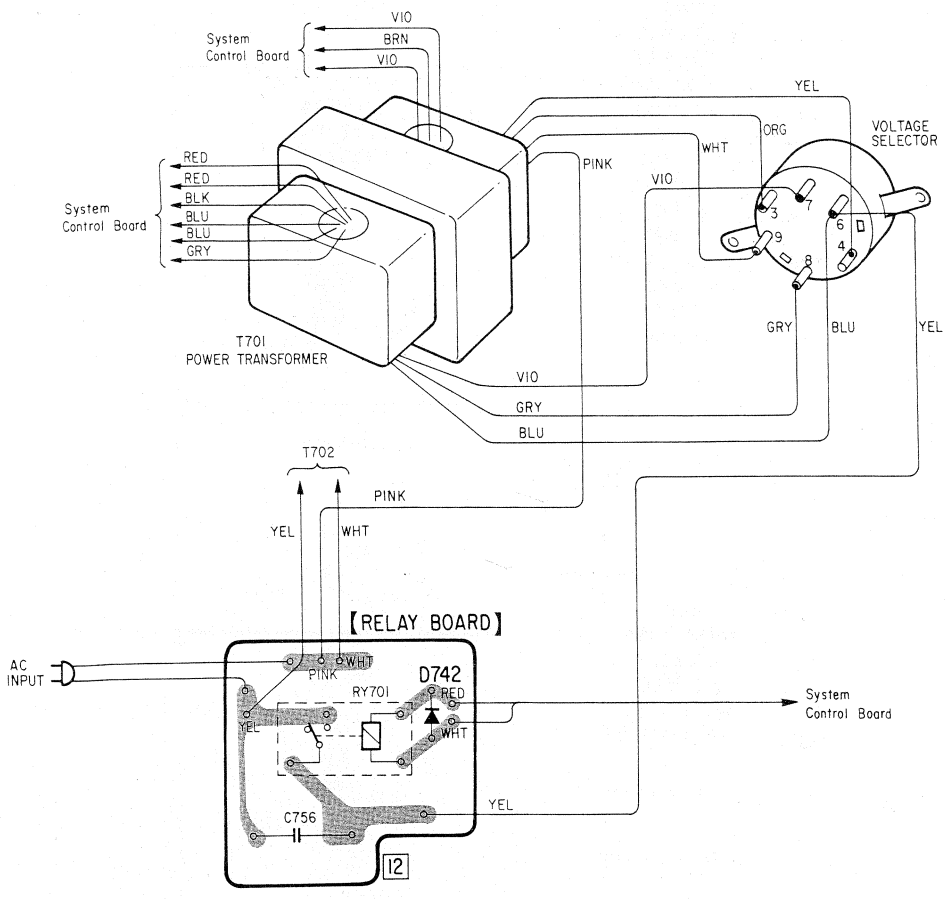
- See page 51 for US, Canadian, AEP, UK model.



4-8. MOUNTING DIAGRAM

– Power Supply Section (E model)

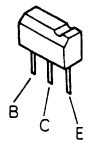
- See page 44 for US, Canadian, AEP, UK model.



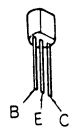
TC-FX1010

• SEMICONDUCTOR LEAD LAYOUTS

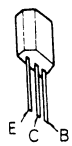
2SA937
2SD637



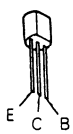
2SA952



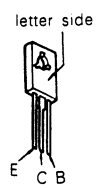
2SA1027R
2SA1138
2SB734
2SC2676
2SD774



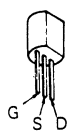
2SC1364
2SC1364-8
2SC2001



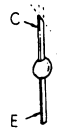
2SB548
2SD414
2SD808



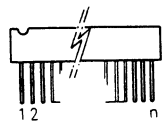
2SK120



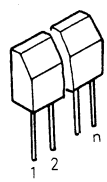
PH102



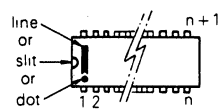
BA6138



CX069R

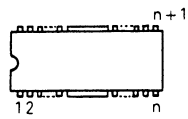


CX174
CX174R
CX7919
MB84052B
MSL912RS
MSM58361RS
NJM2903D
NJM4558D
NJM4560D
NJM4562D
TC40H000P
TC4093BP
TMS1025N2L
μPC339C
μPC4011C
μPC4558C



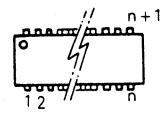
(Top view)

LC7800
MB8851-190
MB88401-11
MSL9359RS
MSM4015RS
MSM4017-4RS



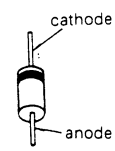
(Top view)

MB84001B
MB84028B
MB84069B

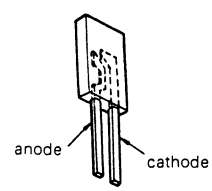


(Top view)

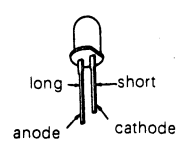
1S1555
10DF2
10E-2
10E2
HZ6A1L
HZ5BLL
HZ6B1L
HZ6C2L
HZ7C1
HZ7B2L
HZ11A1L
HZ11A3L
HZ11C1L
HZ33-1L
RD4.7E-B1Z



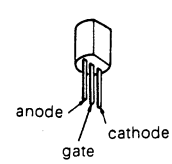
AA5531K
PG5531KX
PY5531K



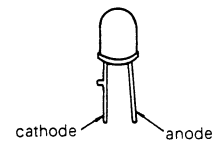
BG5504S



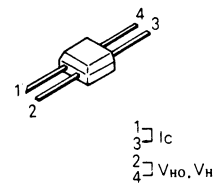
N13T1



SLR-34URC5

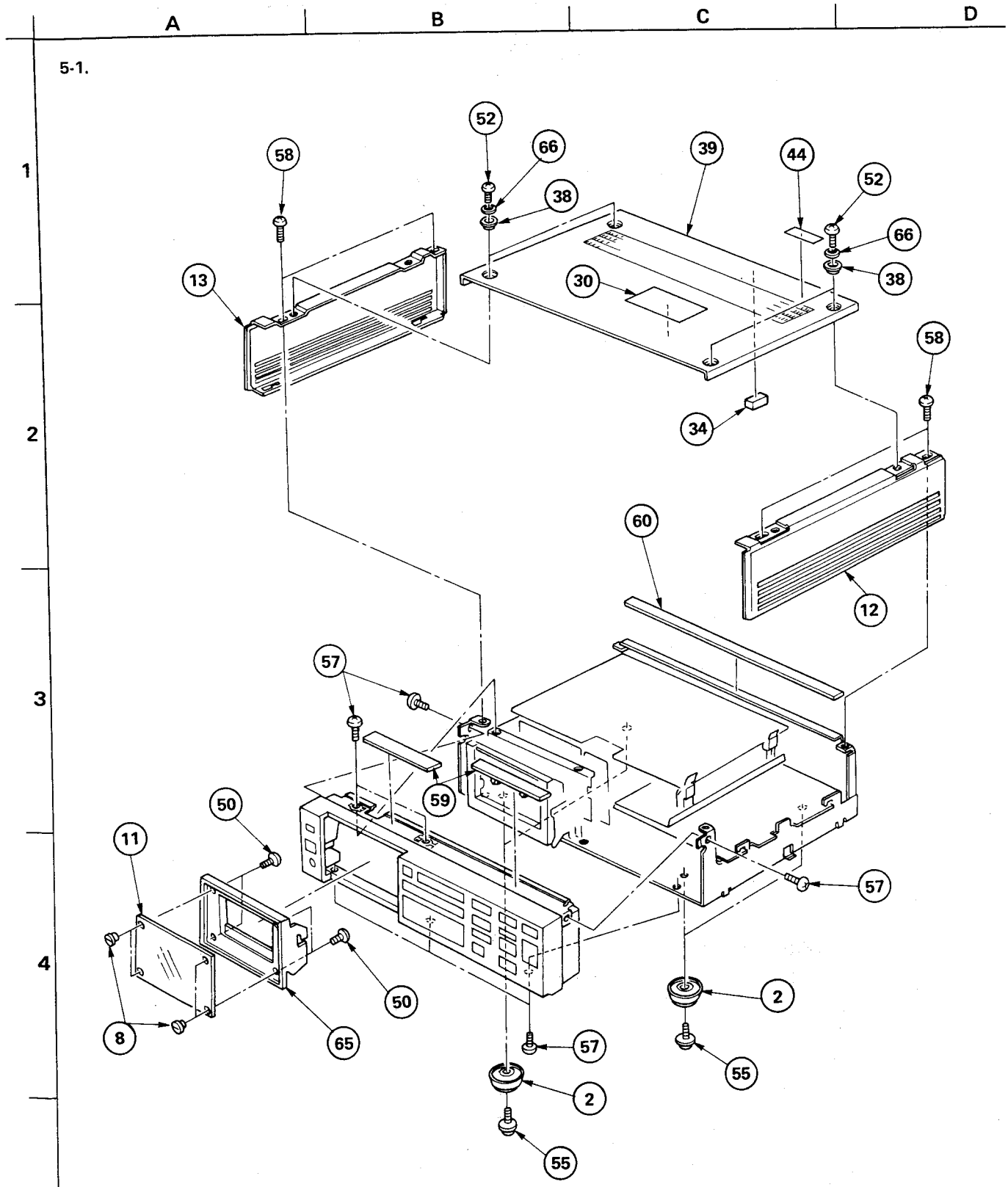


THS102

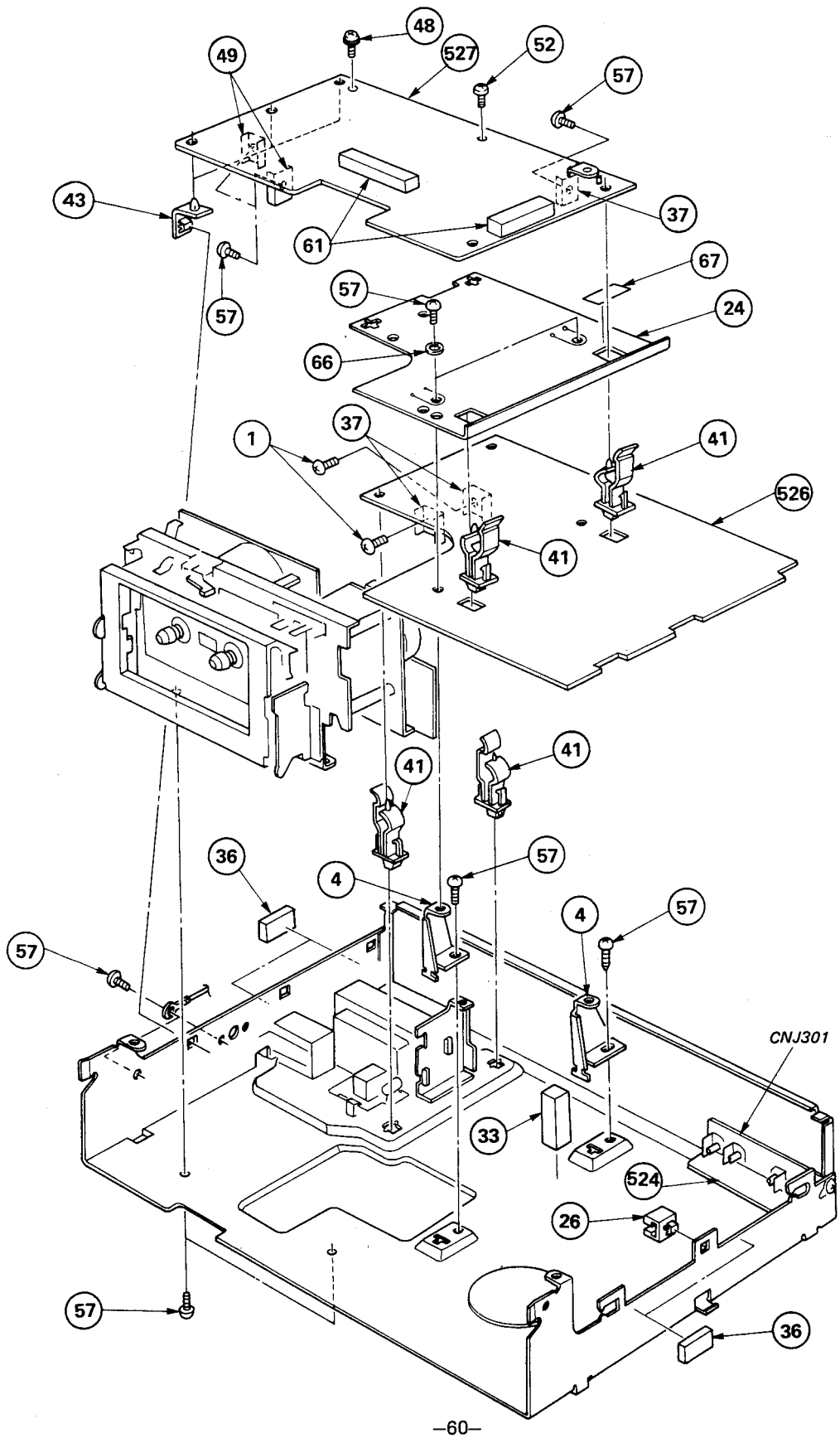


SECTION 5
EXPLODED VIEWS AND PARTS LIST

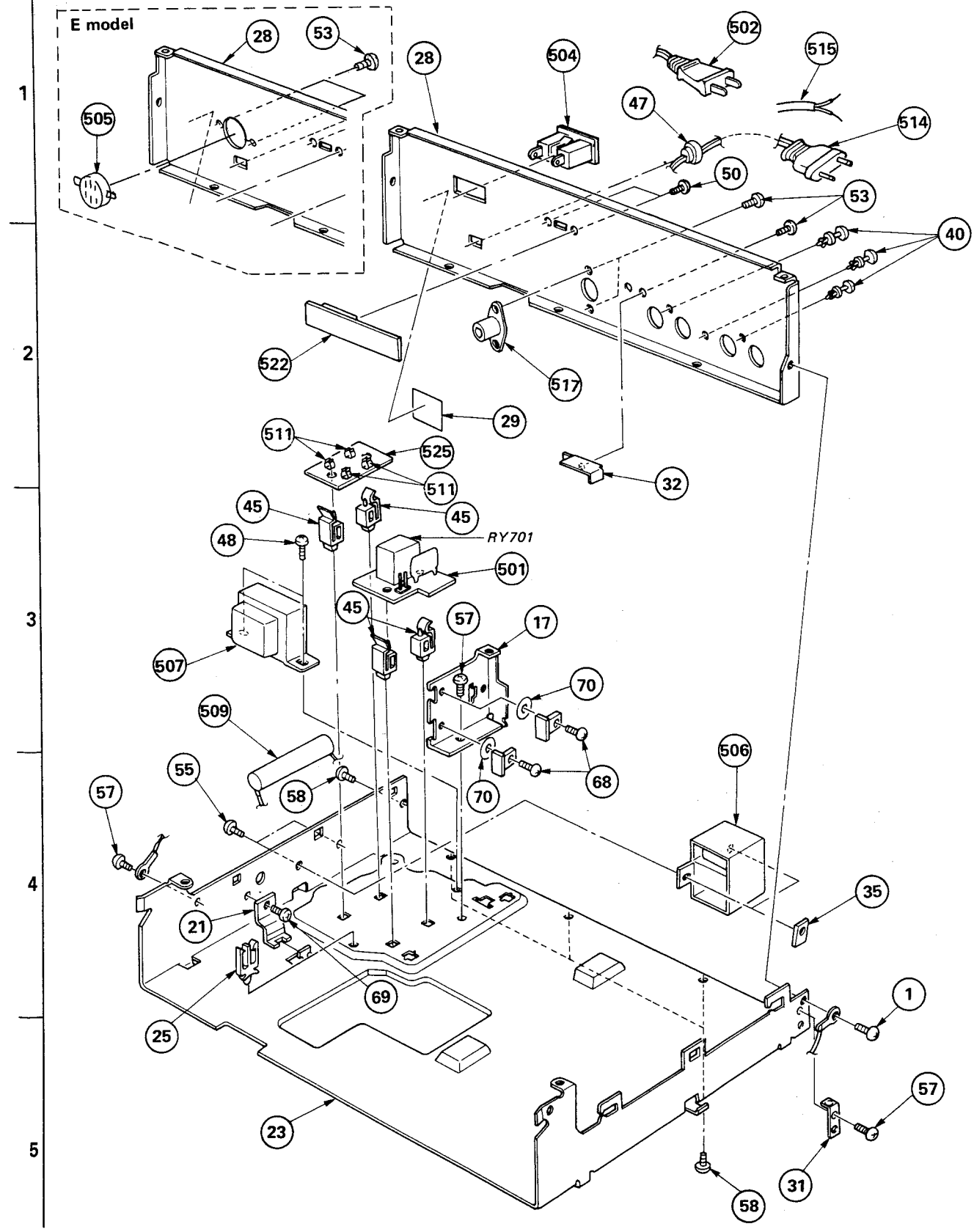
5-1.



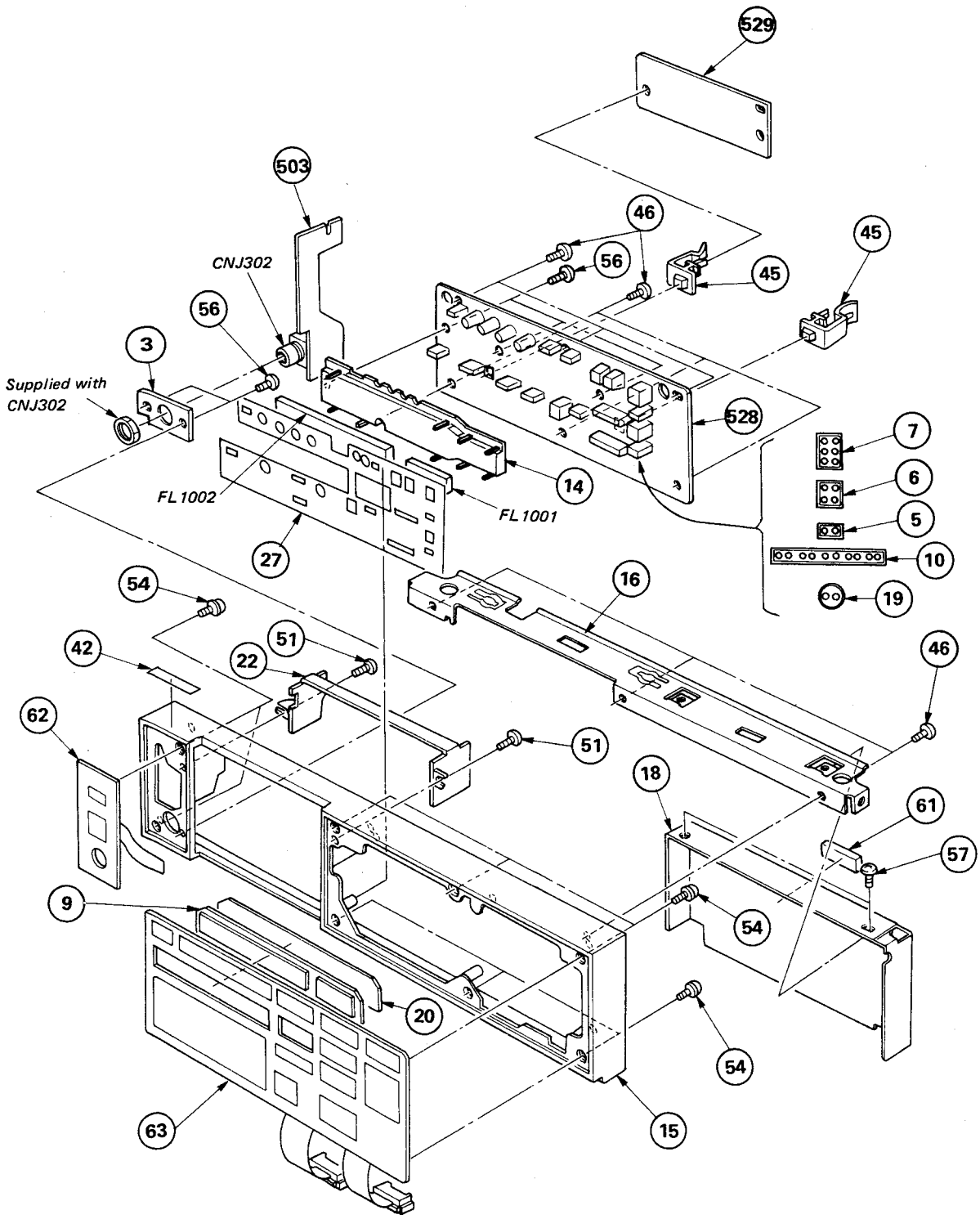
5-2.


48
527
52
57
49
43
37
61
67
57
24
66
1
37
41
526
41
41
41
36
57
4
57
4
57
CNJ301
33
524
26
36

5-3.

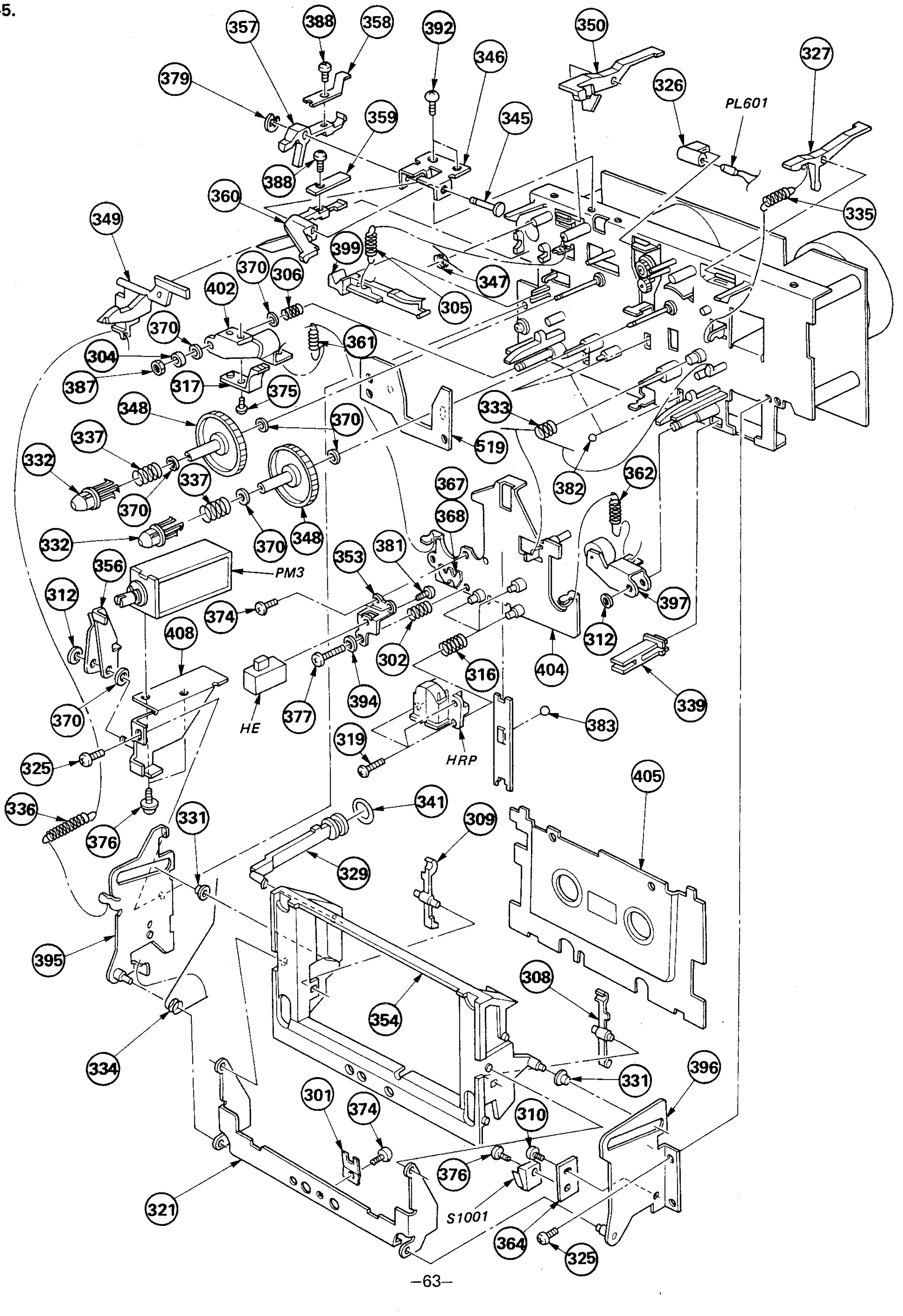

E model
28
53
505
28
504
502
515
47
514
50
53
40
522
517
29
511
525
511
32
45
45
48
RY701
501
45
57
17
507
70
509
55
58
70
68
506
57
35
21
69
25
1
23
57
31
58

5-4.

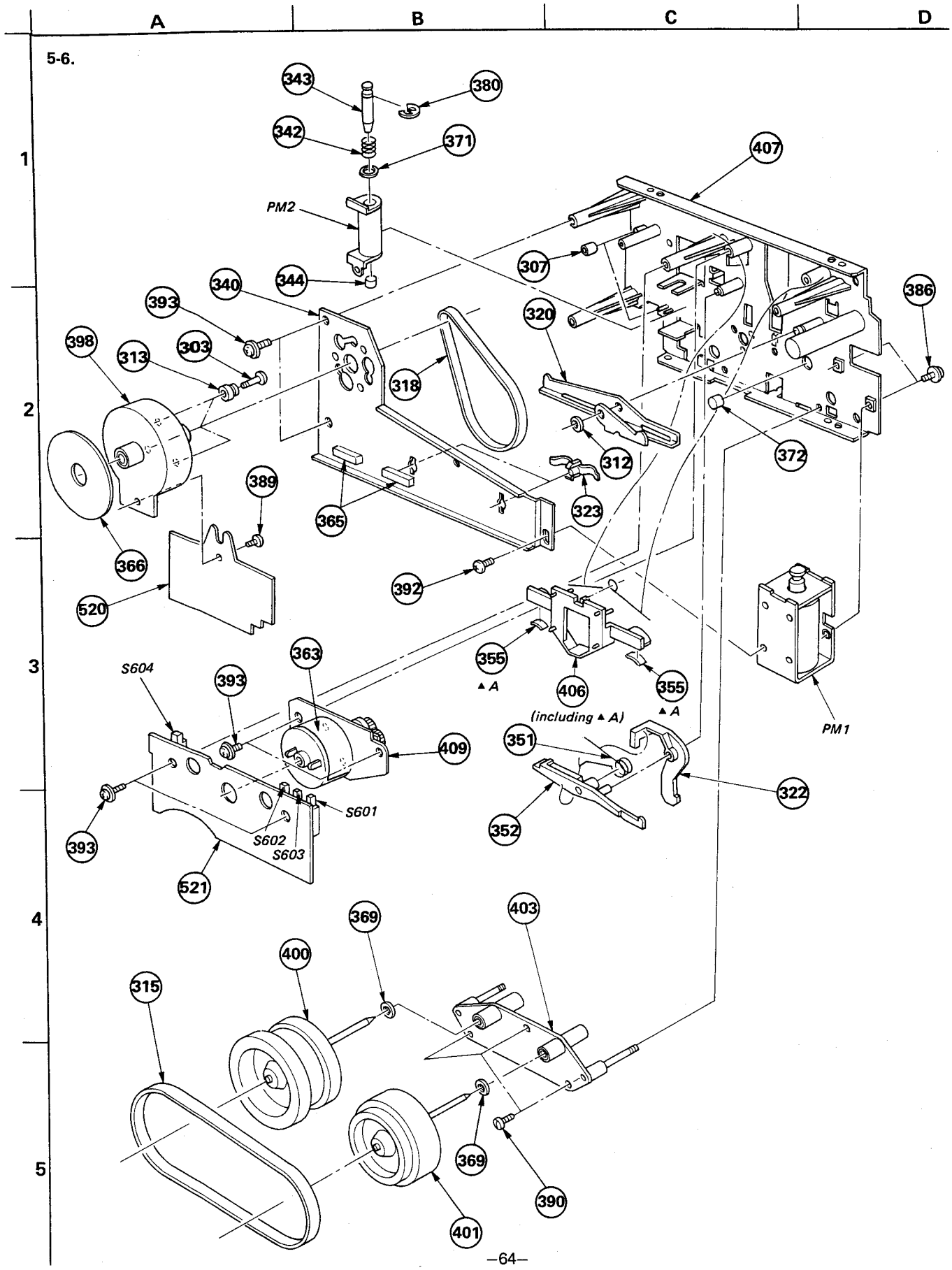

529
503
46
56
45
CNJ302
56
45
3
Supplied with
CNJ302
528
7
6
5
10
19
FL 1002
FL 1001
14
27
54
16
42
51
22
46
62
51
18
61
57
9
54
20
54
63
15

A	B	C	D

5-5.


357
388
358
392
350
346
327
379
326
PL601
359
345
388
360
335
349
399
370
306
347
402
305
370
361
304
387
317
375
348
370
333
519
337
332
382
337
367
362
370
368
332
370
348
381
353
356
PM3
312
374
397
302
408
316
404
312
339
HE
377
394
370
383
319
325
HRP
405
341
336
331
309
376
329
395
308
354
334
331
396
301
374
310
376
321
S1001
364
325

5-6.


A
B
C
D
1
2
3
4
5
343
380
342
371
PM2
344
340
393
303
313
398
318
307
407
320
386
312
372
323
365
389
366
520
392
355
▲A
406
(including ▲A)
355
▲A
PM1
S604
393
363
409
S601
S602
S603
393
521
351
322
352
315
400
369
403
369
390
401

GENERAL SECTION

No.	Part No.	Description
1	2-259-121-00	SCREW, TR
2	3-701-919-99	FOOT ASSY, MINI
3	♣;3-304-603-00	BRACKET, JACK, HEADPHONE
4	♣;3-304-604-00	BRACKET, PC BOARD
5	♣;3-304-605-00	HOLDER (NO.1), LED
6	♣;3-304-606-00	HOLDER (NO.2), LED
7	♣;3-304-607-00	HOLDER (NO.3), LED
8	3-304-608-00	SCREW, ORNAMENTAL, WINDOW
9	3-304-610-00	WINDOW, METER
10	♣;3-304-611-00	HOLDER (NO.5), LED
11	3-304-612-00	WINDOW, CASSETTE
12	3-304-614-00	PLATE (RIGHT), SIDE,ORNAMENTAL
13	3-304-615-00	PLATE (LEFT), SIDE, ORNAMENTAL
14	♣;3-304-619-00	HOLDER, METER
15	3-304-620-00	PANEL, FRONT
16	♣;3-304-621-00	BRACKET, PANEL
17	♣;3-304-622-02	BRACKET, PCB, SYSTEM CONTROL
18	♣;3-304-624-00	PLATE, SHIELD
19	♣;3-304-628-00	HOLDER, LAMP
20	3-304-631-00	PLATE, DP
21	♣;3-304-632-02	SPRING
22	3-304-633-00	PLATE, ORNAMENTAL, CASSETTE
23	♣;3-304-634-07	(US,Canadian,AEP,UK)...CHASSIS
23	♣;3-304-634-11	(E).....CHASSIS
24	♣;3-304-635-00	PLATE, SHIELD, AUDIO
25	♣;3-304-637-00	CLIP, WIRE
26	♣;3-304-638-00	HOLDER, CHASSIS
27	♣;3-304-643-00	PLATE, LAMP
28	3-304-616-15	(US,Canadian)...PLATE, JACK
28	3-304-644-04	(AEP,UK).....PLATE, JACK
28	3-304-644-14	(E).....PLATE, JACK
29	3-304-642-00	(US,Canadian)...LABEL, MODEL NUMBER
29	3-304-645-00	(UK).....LABEL, MODEL NUMBER
29	3-304-646-00	(AEP).....LABEL, MODEL NUMBER
29	3-304-647-00	(E).....LABEL, MODEL NUMBER
30	3-304-648-00	LABEL, CAUTION
31	3-304-649-00	BRACKET (B), PC BOARD
32	3-304-650-00	HOLDER, PC BOARD
33	3-304-651-01	CUSHION (B)
34	3-304-652-01	CUSHION (C)
35	3-536-212-00	NUT, PLATE
36	3-538-026-00	CUSHION
37	♣;3-567-242-00	HEAT SINK
38	3-576-298-00	ESCUTCHEON

GENERAL SECTION

No.	Part No.	Description
39	3-577-660-01	COVER
40	3-646-090-11	RIVET, NYLON
41	♣;3-646-566-00	HOLDER, CHASSIS
42	♣;3-701-690-00	(UK).....LABEL (MADE IN JAPAN)
43	♣;3-701-832-00	HINGE, CIRCUIT BOARD
44	3-703-079-21	(UK,US)...LABEL, CAUTION (BACK)
45	♣;3-703-141-00	HOLDER, PCB
46	7-685-546-19	SCREW +BTP 3X8 TYPE 2 N-S
47	3-701-682-00	(US,Canadian,E)...BUSHING, CORD
47	3-703-244-00	(AEP,UK).....BUSHING, CORD
48	3-703-486-00	+PTTWH 3X5
49	♣;4-861-002-11	HEAT SINK
50	7-621-775-10	SCREW +B 2.6X4
51	7-621-775-20	SCREW +B 2.6X5
52	7-682-546-04	SCREW +B 3X5
53	7-682-546-09	SCREW +B 3X5
54	7-682-947-01	SCREW +PSW 3X6
55	7-682-948-01	SCREW +PSW 3X8
56	7-685-545-19	SCREW +BTP 3X6 TYPE2 N-S
57	7-685-871-01	SCREW +BVTT 3X6 (S)
58	7-685-872-01	SCREW +BVTT 3X8 (S)
59	9-911-840-XX	CUSHION (A)
60	9-911-844-XX	PACKING (A)
61	9-911-846-XX	CUSHION
62	A-2053-089-A	SWITCH (SMALL) ASSY, SHEET
63	X-3304-604-1	SWITCH (LARGE) ASSY, SHEET
64	.....	
65	X-3304-605-1	CASSETTE HOLDER ASSY
66	7-688-003-11	WASHER
67	9-911-863-XX	INSULATOR
68	7-682-548-01	+B 3X8
69	7-685-870-01	+BVTT 3X5
70	3-572-365-01	INSULATOR
71	9-911-843-XX	CUSHION
72	♣;3-304-657-00	(E)....BRACKET, TRANSFORMER
73	♣;3-575-567-00	(E)....COVER, POWER SWITCH
74	3-703-037-00	(E)....INSULATOR (FOR TRANSISTOR Q740)

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- Items marked " ♣ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part numbers (Δ-ΔΔΔ-ΔΔΔ-XX or Δ-ΔΔΔΔ-ΔΔΔ-X) may be different from those used in the set.

CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ACCESSORY & PACKING MATERIAL

Part No.	Description
1-551-734-11	CORD, CONNECTION (RK-74A)
3-304-625-11	CUSHION, LOWER
3-304-626-11	CUSHION, UPPER
3-304-653-00	INDIVIDUAL CARTON
3-304-654-00	CUSHION (UPPER), ASSIST
3-304-655-00	CUSHION (LOWER), ASSIST
3-572-374-00	BAG, PROTECTION
3-701-630-00	BAG, POLYETHYLENE
3-783-833-12	(AEP,UK,E).....MANUAL, INSTRUCTION
3-783-833-21	(US,Canadian)...MANUAL, INSTRUCTION
3-783-833-31	(Canadian).....MANUAL, INSTRUCTION
3-783-833-41	(AEP).....MANUAL, INSTRUCTION
3-783-833-52	(AEP).....MANUAL, INSTRUCTION
3-793-481-13	(UK,E,AEP)...INSTRUCTION
3-793-828-11	QUESTIONNAIRE
3-795-343-11	(AEP,UK,E).....CARD, INSTRUCTION
3-795-343-21	(US,Canadian)...CARD, INSTRUCTION
X-3701-105-0	ROD ASSY, CLEANING, HEAD

MECHANISM SECTION

No.	Part No.	Description
301	3-304-639-00	PLATE, SHIELD, HEAD
302	3-481-272-00	SPRING, COMPRESSION
303	3-489-077-21	SCREW, MOTOR STOPPER
304	3-491-191-00	COLLAR
305	3-537-205-00	SPRING, TENSION
306	3-537-213-00	SPRING, COMPRESSION
307	3-538-051-00	RUBBER, BRAKE
308	3-555-113-00	SPRING (RIGHT)
309	3-555-114-00	SPRING (LEFT)
310	7-621-739-00	+PSW 2X5
311	3-558-708-11	WASHER, STOPPER
312	3-558-708-21	WASHER, STOPPER
313	3-564-017-00	RUBBER, CUSHION
314	.....	
315	3-564-088-00	BELT (2), CAPSTAN
316	3-564-121-00	SPRING, COMPRESSION
317	3-564-138-00	GUIDE (S), TAPE
318	3-564-319-00	BELT, CAPSTAN
319	3-701-467-00	SCREW WITH TOOTH
320 ♣	3-575-307-00	LEVER, FWD
321 ♣	3-575-314-00	LEVER, FULCRUM, HOLDER

MECHANISM SECTION

No.	Part No.	Description
322	3-575-318-00	LEVER, LOCK, TUNING
323	3-575-321-00	RETAINER, THRUST, CAPSTAN
324	.....	
325	7-685-861-01	+BVTT 2.6X5 (S)
326	3-575-328-00	HOLDER, LAMP
327 ♣	3-575-331-00	LEVER, DETECTION, HALF
328	.....	
329	3-575-333-00	PISTON
330	3-575-345-00	SPRING
331	3-575-348-00	ROLLER, GUIDE, THREADING
332	3-575-350-00	CLAW, REEL TABLE
333	3-575-351-00	SPRING
334	3-575-356-00	SPRING
335	3-575-358-00	SPRING, TENSION
336	3-575-364-00	SPRING, TENSION
337	3-575-365-00	SPRING, COMPRESSION
338 ♣	3-575-377-00	SPRING
339 ♣	3-575-378-00	GUIDE, LEAD
340 ♣	3-575-381-00	RETAINER (W), THRUST
341	3-575-392-00	RING, PISTON
342	3-575-414-00	SPRING, COMPRESSION
343	3-575-415-11	ARBOR, MOVABLE
344	3-575-416-11	ARBOR, FIXED
345 ♣	3-575-439-00	SHAFT, LEVER, DETECTION
346 ♣	3-575-440-00	BRACKET, LEVER, DETECTION
347	3-575-441-00	SPRING
348	3-575-447-00	TABLE, REEL
349	3-575-448-00	LEVER, LOCK
350	3-575-449-00	LEVER, DETECTION, REC
351	3-575-458-00	SPRING
352	3-575-460-00	LEVER, SELECT TUNE
353 ♣	3-575-464-00	BRACKET, HEAD, ERASE
354	3-575-466-03	HOLDER, CASSETTE
355	3-575-469-00	SHOE, BRAKE
356 ♣	3-575-476-00	LEVER, EJECT
357 ♣	3-575-477-00	LEVER, DETECTION
358	3-575-478-00	SPRING
359	3-575-479-00	SPRING
360 ♣	3-575-480-00	LEVER, DETECTION
361	3-575-481-00	SPRING, TENSION
362	3-575-482-00	SPRING, TENSION
363	3-575-483-00	PLATE (C), SHIELD, MOTOR
364 ♣	3-575-484-00	BRACKET, SWITCH, MICROPHONE
365	3-575-485-00	RUBER, VIBRATION PROOF
366	3-575-486-00	SHEET, VIBRATION PROOF

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CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

MECHANISM SECTION

No.	Part No.	Description
367	3-576-835-01	SEAM, ADJUSTMENT, ERASE HEAD
368	3-576-835-11	SEAM, ADJUSTMENT, ERASE HEAD
369	3-701-438-21	WASHER
370	3-701-439-21	WASHER
371	3-701-444-11	WASHER, 6
372	4-855-109-12	RUBBER, LIFTER CUSHION
373	7-621-772-30	SCREW +B 2X6
374	7-621-772-00	SCREW +B 2X3
375	7-621-772-10	SCREW +B 2X4
376	7-621-772-50	SCREW +B 2X10
377	7-621-775-50	SCREW +B 2.6X10
378	7-621-775-10	SCREW +B 2.6X4
379	7-624-104-04	STOP RING 2.0, TYPE -E
380	7-624-110-04	STOP RING 6.0, TYPE -E
381	7-627-552-38	SCREW, PRECISION +P 1.7X3
382	7-671-112-11	BALL, STEEL
383	7-671-113-11	BALL, STEEL
384	7-682-646-01	SCREW +PS 3X5
385	7-682-947-01	SCREW +PSW 3X6
386	7-682-949-01	SCREW +PSW 3X10
387	7-684-023-04	N 3, TYPE 2
388	7-685-131-21	SCREW +P 2.6X4 TYPE2 SLIT
389	7-685-533-11	SCREW +BTP 2.6X6 TYPE2 N-S
390	7-685-791-01	SCREW +PTT 2.6X5 (S)
391	7-685-862-01	SCREW +BVTT 2.6X6 (S)
392	7-685-870-01	SCREW +BVTT 3X5 (S)
393	7-687-246-21	SCREW, TOTSU PTPWH 3X8, TYPE2
394	7-688-002-12	W 2.6, MIDDLE
395 ♦	X-3575-301-0	PLATE (A) ASSY, HOLDER FULCRUM
396 ♦	X-3575-302-0	PLATE (B) ASSY, FULCRUM
397	X-3575-304-0	PINCH LEVER (T) ASSY
398	X-3575-308-0	MOTOR COMPLETE ASSY, BSL
399	X-3575-310-0	LEVER ASSY, TENSION, BACK
400	X-3575-319-0	FLYWHEEL (RIGHT) ASSY
401	X-3575-320-0	FLYWHEEL (LEFT) ASSY
402	X-3575-321-0	PINCH LEVER (S) ASSY
403	X-3575-322-0	BASE ASSY, CAPSTAN
404	X-3575-323-0	CHASSIS ASSY, HEAD
405	X-3575-340-0	PLATE ASSY, ORNAMENTAL
406 ♦	X-3575-342-0	PLATE ASSY, BRAKE
407 ♦	X-3575-344-0	CHASSIS ASSY, MECHANISM
408 ♦	X-3575-346-0	BRACKET ASSY, EJECT SOLENOID
409	X-3575-349-0	MOTOR ASSY, REEL

ELECTRICAL PARTS

Ref.No.	Part No.	Description
501	1-606-863-00	PC BOARD, RELAY
502 ⚠	1-534-986-XX	(US,Canadian)...CORD, POWER
502 ⚠	1-551-473-00	(E).....CORD, POWER
502 ⚠	1-555-734-00	(E).....CORD, POWER
502 ⚠	1-534-817-31	(AEP).....CORD, POWER
502 ⚠	1-551-884-00	(UK).....CORD, POWER
503	1-606-861-00	PC BOARD, HEADPHONE
504 ⚠	1-526-609-00	(US).....CONNECTOR, AC OUTLET
504 ⚠	1-526-882-00	(Canadian)...CONNECTOR, AC OUTLET
505 ⚠	1-526-576-00	(E)....VOLTAGE SELECTOR
506 ♦	1-508-878-00	BASE POST
507	1-528-098-00	BATTERY, STORAGE, NICKEL CADMIUM
508 ⚠	1-533-131-00	(AEP,UK,E)...HOLDER, FUSE
509 ♦	1-535-115-00	TERMINAL
510 ♦	1-535-139-00	BASE POST 19MM (10MM PITCH)
511 ♦	1-560-200-00	BASE POST, MCD CONNECTOR 2P
512	1-561-598-00	SOCKET 4P
513	1-561-852-00	SOCKET, CONNECTOR 5P
514 ♦	1-603-823-00	PC BOARD, PHOTO
515 ♦	1-603-825-00	PC BOARD, SERVO
516 ♦	1-606-858-00	PC BOARD, MD
517	1-607-667-00	PC BOARD, SWITCH
518 ♦	1-606-860-00	PC BOARD, INPUT/OUTPUT JACK
519 ♦	1-607-485-11	(AEP,UK)...PC BOARD, FUSE
519 ♦	1-607-485-21	(E).....PC BOARD, FUSE
520 ♦	A-2010-213-A	(AEP,UK,E).....MOUNTED PCB, RECORD/PLAYBACK
520 ♦	A-2010-217-A	(US,Canadian)...MOUNTED PCB, RECORD/PLAYBACK
521 ♦	A-2019-139-A	(US,Canadian)...MOUNTED PCB, SYSTEM CONTROL
521 ♦	A-2019-143-A	(AEP,UK).....MOUNTED PCB, SYSTEM CONTROL
521 ♦	A-2019-149-A	(E).....MOUNTED PCB, SYSTEM CONTROL
522	A-2095-458-A	MOUNTED PCB, INDICATOR (LARGE)
523	A-2095-459-A	MOUNTED PCB, INDICATOR (SMALL)
BZ701	1-529-015-00	BUZZER

C104	1-130-305-00	FILM	0.022MF	5%	100V
C106	1-130-307-00	FILM	0.027MF	5%	100V
C107	1-130-273-00	FILM	0.001MF	5%	100V
C109	1-130-275-00	FILM	0.0012MF	5%	100V
C117	1-130-297-00	FILM	0.01MF	5%	100V
C118	1-130-301-00	FILM	0.015MF	5%	100V

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CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

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SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C119	1-130-297-00	FILM	0.01MF	5%	100V
C123	1-130-304-00	FILM	0.02MF	5%	100V
C124	1-130-299-00	FILM	0.012MF	5%	100V
C129	1-130-277-00	FILM	0.0015MF	5%	100V
C132	1-130-307-00	FILM	0.027MF	5%	100V
C141	1-130-851-00	FILM	0.082MF	3%	100V
C142	1-123-234-00	ELECT	10MF	20%	50V(NONPOLAR)
C143	1-130-341-00	FILM	0.056MF	3%	100V
C144	1-130-857-00	FILM	0.047MF	3%	100V
C145	1-130-856-00	FILM	0.0068MF	3%	100V
C146	1-123-453-00	ELECT	4.7MF	20%	50V(NONPOLAR)
C148	1-107-172-00	SILVERED MICA	130PF	5%	500V
C149	1-130-277-00	FILM	0.0015MF	5%	100V
C204	1-130-305-00	FILM	0.022MF	5%	100V
C206	1-130-307-00	FILM	0.027MF	5%	100V
C207	1-130-273-00	FILM	0.001MF	5%	100V
C209	1-130-275-00	FILM	0.0012MF	5%	100V
C217	1-130-297-00	FILM	0.01MF	5%	100V
C218	1-130-301-00	FILM	0.015MF	5%	100V
C219	1-130-297-00	FILM	0.01MF	5%	100V
C223	1-130-304-00	FILM	0.02MF	5%	100V
C224	1-130-299-00	FILM	0.012MF	5%	100V
C229	1-130-277-00	FILM	0.0015MF	5%	100V
C232	1-130-307-00	FILM	0.027MF	5%	100V
C241	1-130-851-00	FILM	0.082MF	3%	100V
C242	1-123-234-00	ELECT	10MF	20%	50V(NONPOLAR)
C243	1-130-341-00	FILM	0.056MF	3%	100V
C244	1-130-857-00	FILM	0.047MF	3%	100V
C245	1-130-856-00	FILM	0.0068MF	3%	100V
C246	1-123-453-00	ELECT	4.7MF	20%	50V(NONPOLAR)
C248	1-107-172-00	SILVERED MICA	130PF	5%	500V
C249	1-130-277-00	ELECT	0.0015MF	5%	100V
C737	1-123-324-00	ELECT	1000MF	20%	16V
C738	1-123-326-00	ELECT	3300MF	20%	16V
C742	1-123-364-00	ELECT	1000MF	20%	50V
C743 ⚠	1-123-333-00	ELECT	100MF	20%	25V
C746	1-123-361-00	ELECT	220MF	20%	50V
C756	1-123-744-00	FILM	10000PF		400V
CNJ100	1-561-852-00	SOCKET, CONNECTOR 5P			
CNJ101	1-561-853-00	SOCKET, CONNECTOR 8P			
CNJ301	1-507-531-41	PLATE, PIN-JACK			
CNJ302	1-507-649-00	JACK			
CNP1 ♦	1-560-064-00	PIN, CONNECTOR 6P			
CNP2 ♦	1-560-062-00	PIN, CONNECTOR 4P			
CNP3 ♦	1-560-061-00	PIN, CONNECTOR 3P			

ELECTRICAL PARTS

Ref.No.	Part No.	Description
CNP4 ♦	1-560-062-00	PIN, CONNECTOR 4P
CNP5 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP6 ♦	1-560-063-00	PIN, CONNECTOR 5P
CNP7 ♦	1-560-064-00	PIN, CONNECTOR 6P
CNP8 ♦	1-560-065-00	PIN, CONNECTOR 8P
CNP9 ♦	1-560-061-00	PIN, CONNECTOR 3P
CNP10 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP11 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP12 ♦	1-560-062-00	PIN, CONNECTOR 4P
CNP13 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP14 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP15 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP16 ♦	1-560-064-00	PIN, CONNECTOR 6P
CNP17 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP18 ♦	1-535-116-00	TERMINAL
CNP19 ♦	1-560-062-00	PIN, CONNECTOR 4P
CNP20 ♦	1-560-062-00	PIN, CONNECTOR 4P
CNP21 ♦	1-535-116-00	TERMINAL
CNP22 ♦	1-560-062-00	PIN, CONNECTOR 4P
CNP23 ♦	1-560-061-00	PIN, CONNECTOR 3P
CNP24 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP25 ♦	1-560-061-00	PIN, CONNECTOR 3P
CNP26 ♦	1-560-061-00	PIN, CONNECTOR 3P
CNP27 ♦	1-560-063-00	PIN, CONNECTOR 5P
CNP28 ♦	1-535-116-00	TERMINAL
CNP29 ♦	1-535-116-00	TERMINAL
CNP30 ♦	1-560-061-00	PIN, CONNECTOR 3P
CNP32 ♦	1-535-116-00	TERMINAL
CNP33 ♦	1-560-060-00	PIN, CONNECTOR 2P
CNP40 ♦	1-560-062-00	PIN, CONNECTOR 4P
CP301	1-464-148-00	UNIT, BIAS OSCILLATOR
D301	8-719-910-64	DIODE HZ6B1L
D302	8-719-910-64	DIODE HZ6B1L
D303	8-719-815-55	DIODE 1S1555
D304	8-719-815-55	DIODE 1S1555
D305	8-719-815-55	DIODE 1S1555
D306	8-719-910-61	DIODE HZ6A1L
D307	8-719-815-55	DIODE 1S1555
D308	8-719-815-55	DIODE 1S1555
D309	8-719-910-64	DIODE HZ6B1L
D310	8-719-815-55	DIODE 1S1555
D311	8-719-951-12	DIODE HZ5BLL
D601	8-719-815-55	DIODE 1S1555
D602	8-719-815-55	DIODE 1S1555
D603	8-719-815-55	DIODE 1S1555
D701	8-719-815-55	DIODE 1S1555

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SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description
D702	8-719-815-55	DIODE 1S1555
D703	8-719-815-55	DIODE 1S1555
D704	8-719-815-55	DIODE 1S1555
D705	8-719-815-55	DIODE 1S1555
D706	8-719-815-55	DIODE 1S1555
D707	8-719-815-55	DIODE 1S1555
D708	8-719-815-55	DIODE 1S1555
D709	8-719-815-55	DIODE 1S1555
D710	8-719-910-75	DIODE HZ7B2L
D711	8-719-951-12	DIODE HZ5BLL
D712	8-719-815-55	DIODE 1S1555
D713	8-719-200-02	DIODE 10E-2
D714	8-719-815-55	DIODE 1S1555
D715	8-719-200-02	DIODE 10E-2
D716	8-719-815-55	DIODE 1S1555
D717	8-719-815-55	DIODE 1S1555
D718	8-719-815-55	DIODE 1S1555
D719	8-719-815-55	DIODE 1S1555
D720	8-719-815-55	DIODE 1S1555
D721	8-719-910-64	DIODE HZ6B1L
D722 ⚠	8-719-210-12	DIODE 10DF2
D723 ⚠	8-719-210-12	DIODE 10DF2
D724 ⚠	8-719-210-12	DIODE 10DF2
D725 ⚠	8-719-210-12	DIODE 10DF2
D726 ⚠	8-719-200-02	DIODE 10E-2
D727 ⚠	8-719-200-02	DIODE 10E-2
D728 ⚠	8-719-200-02	DIODE 10E-2
D729 ⚠	8-719-200-02	DIODE 10E-2
D730	8-719-910-15	DIODE HZ11B2L
D731	8-719-910-15	DIODE HZ11B2L
D732	8-719-200-02	DIODE 10E-2
D733	8-719-913-31	DIODE HZ33-1L
D734	8-719-910-64	DIODE HZ6B1L
D735	8-719-815-55	DIODE 1S1555
D736 ⚠	8-719-200-02	DIODE 10E-2
D737 ⚠	8-719-200-02	DIODE 10E-2
D738 ⚠	8-719-200-02	DIODE 10E-2
D739 ⚠	8-719-200-02	DIODE 10E-2
D740 ⚠	8-719-200-02	DIODE 10E-2
D741	8-719-910-24	DIODE HZ12B1L
D742	8-719-815-55	DIODE 1S1555
D743	8-719-931-10	DIODE EQB01-10
D744	8-719-910-68	DIODE HZ6C2L
D745	8-719-200-02	DIODE 10E-2
D746	8-719-910-17	DIODE HZ11C1L

ELECTRICAL PARTS

Ref.No.	Part No.	Description
D747	8-719-910-17	DIODE HZ11C1L
D748	8-719-910-17	DIODE HZ11C1L
D749	8-719-815-55	DIODE 1S1555
D750	8-719-815-55	DIODE 1S1555
D751	8-719-910-64	DIODE HZ6B1L
D752	8-719-910-13	DIODE HZ11A3L
D753	8-719-200-02	DIODE 10E-2
D754	8-719-815-55	DIODE 1S1555
D755	8-719-200-02	DIODE 10E-2
D756	8-719-815-55	DIODE 1S1555
D757	8-719-815-55	DIODE 1S1555
D758	8-719-815-55	DIODE 1S1555
D759	8-719-994-71	DIODE HZ7C1
D760	8-719-815-55	DIODE 1S1555
D761	8-719-815-55	DIODE 1S1555
D901	8-719-147-24	DIODE RD4.7E-B1Z
D1000	8-719-905-31	DIODE PY5531K
D1001	8-719-905-31	DIODE PY5531K
D1002	8-719-955-33	DIODE AA5531K
D1003	8-719-955-33	DIODE AA5531K
D1004	8-719-955-33	DIODE AA5531K
D1005	8-719-905-31	DIODE PY5531K
D1006	8-719-905-31	DIODE PY5531K
D1007	8-719-955-33	DIODE AA5531K
D1010	8-719-905-31	DIODE PY5531K
D1011	8-719-905-31	DIODE PY5531K
D1012	8-719-905-31	DIODE PY5531K
D1013	8-719-905-31	DIODE PY5531K
D1014	8-719-955-33	DIODE PY5531K
D1015	8-719-955-32	DIODE PG5531KX
D1016	8-719-955-32	DIODE PG5531KX
D1020	8-719-905-31	DIODE PY5531K
D1022	8-719-905-31	DIODE PY5531K
D1023	8-719-905-31	DIODE PY5531K
D1024	8-719-955-33	DIODE AA5531K
D1025	8-719-905-31	DIODE PY5531K
D1026	8-719-955-33	DIODE AA5531K
D1027	8-719-955-32	DIODE PG5531KX
D1030	8-719-905-31	DIODE PY5531K
D1032	8-719-905-31	DIODE PY5531K
D1033	8-719-815-55	DIODE 1S1555
D1034	8-719-955-33	DIODE AA5531K
D1035	8-719-955-33	DIODE AA5531K
D1036	8-719-905-31	DIODE PY5531K
D1037	8-719-934-05	DIODE SLR-34URC5

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CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

TC-FX1010

ELECTRICAL PARTS

Ref.No.	Part No.	Description
D1040	8-719-905-31	DIODE PY5531K
D1042	8-719-902-60	DIODE BG5504S
D1043	8-719-905-31	DIODE PY5531K
D1044	8-719-955-33	DIODE AA5531K
D1045	8-719-934-05	DIODE SLR-34URC5
D1051	8-719-902-21	DIODE HZ22-1L
D1052	8-719-815-55	DIODE 1S1555
D1053	8-719-815-55	DIODE 1S1555
F1	⚠1-532-078-00	(AEP,UK)...FUSE, TIME-LAG (1.0A)
F1	⚠1-532-285-00	(E).....FUSE, TIME-LAG (1.25A)
F2	⚠1-532-078-00	(AEP,UK)...FUSE, TIME-LAG (1.0A)
F2	⚠1-532-285-00	(E).....FUSE, TIME-LAG (1.25A)
FL1001	1-519-242-00	INDICATOR TUBE (FIP3C5)
FL1002	1-519-243-00	INDICATOR TUBE (COUNTER,LEVEL)
HE	8-825-604-30	HEAD, ERASE
HRP	8-825-728-21	HEAD, REC/PB RPS202-3602A
H901	8-719-814-11	DIODE THS102
H902	8-719-814-11	DIODE THS102
IC101	8-759-300-74	IC CX174A
IC102	8-759-300-74	IC CX174A
IC201	8-759-300-74	IC CX174A
IC202	8-759-300-74	IC CX174A
IC301	8-759-705-62	IC NJM4562D
IC302	8-759-145-58	IC UPC4558C
IC303	8-759-145-58	IC UPC4558C
IC304	8-759-145-57	IC UPC4557C
IC305	8-759-145-57	IC UPC4557C
IC306	8-759-961-38	IC BA6138
IC307	8-759-745-60	IC NJM4560D
IC308	8-759-145-57	IC UPC4557C
IC309	8-757-919-00	IC CX-7919
IC701	8-759-808-00	IC LC7800
IC702	8-759-985-01	IC MB84001B
IC703	8-759-905-25	IC MB88401-11
IC704	8-759-905-26	IC MB8851-190
IC705	8-759-984-69	IC MB84069B
IC706	8-759-940-15	IC MSM4015RS
IC707	8-759-140-11	IC UPD4011C
IC708	8-759-904-70	IC MSM40174RS
IC709	8-759-240-93	IC TC4093BP
IC710	8-759-220-00	IC TC40H000P
IC711	8-759-990-25	IC TMS1025N2L

ELECTRICAL PARTS

Ref.No.	Part No.	Description
IC712	8-759-145-58	IC UPC4558C
IC713	8-759-240-52	IC TC4052BP
IC714	8-759-745-60	IC NJM4560D
IC715	8-759-745-60	IC NJM4560D
IC716	8-759-133-90	IC UPC339C
IC717	8-759-729-03	IC NJM2903D
IC718	8-759-900-71	IC MSM58361RS
IC719	8-759-140-11	IC UPD4011C
IC720	8-759-745-60	IC NJM4560D
IC721	8-759-745-60	IC NJM4560D
IC722	8-759-729-03	IC NJM2903D
IC901	8-759-600-69	IC CX-069A
IC902	8-759-700-58	IC NJM4558D-FA
IC1001	8-759-984-28	IC MB84028B
IC1002	8-759-981-12	IC MSL912RS
IC1003	8-759-981-12	IC MSL912RS
IC1004	8-759-904-72	IC MSL9359RS
L102	1-408-259-00	MICRO INDUCTOR 15MMH
L103	1-408-259-00	MICRO INDUCTOR 15MMH
L104	1-408-256-00	MICRO INDUCTOR 8.2MMH
L105	1-408-254-00	MICRO INDUCTOR 5.6MMH
L106	1-408-253-00	MICRO INDUCTOR 4.7MMH
L107	1-408-251-00	MICRO INDUCTOR 3.3MMH
L202	1-408-259-00	MICRO INDUCTOR 15MMH
L203	1-408-259-00	MICRO INDUCTOR 15MMH
L204	1-408-256-00	MICRO INDUCTOR 8.2MMH
L205	1-408-254-00	MICRO INDUCTOR 5.6MMH
L206	1-408-253-00	MICRO INDUCTOR 4.7MMH
L207	1-408-251-00	MICRO INDUCTOR 3.3MMH
LPF101	1-235-099-00	FILTER, LOW PASS
LPF201	1-235-099-00	FILTER, LOW PASS
PL301	1-518-386-00	LAMP, PILOT
PL302	1-518-386-00	LAMP, PILOT
PL601	1-518-313-00	LAMP, PILOT
PL1001	1-518-259-21	LAMP, PILOT
PL1002	1-518-259-21	LAMP, PILOT
PL1003	1-518-259-21	LAMP, PILOT
PL1004	1-518-259-21	LAMP, PILOT
PM1	1-454-288-00	SOLENOID, PLUNGER
PM2	1-454-291-00	SOLENOID, PLUNGER
PM3	1-454-303-00	SOLENOID, PLUNGER
Q101	8-729-663-48	TRANSISTOR 2SC1364-8
Q102	8-729-663-47	TRANSISTOR 2SC1364
Q103	8-729-663-47	TRANSISTOR 2SC1364

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- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
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- MMH : mH, UH : μH

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SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description
Q104	8-729-100-13	TRANSISTOR 2SC2001
Q105	8-729-663-48	TRANSISTOR 2SC1364-8
Q106	8-729-663-48	TRANSISTOR 2SC1364-8
Q107	8-729-100-13	TRANSISTOR 2SC2001
Q108	8-729-663-48	TRANSISTOR 2SC1364-8
Q109	8-729-663-48	TRANSISTOR 2SC1364-8
Q110	8-729-663-48	TRANSISTOR 2SC1364-8
Q111	8-729-663-47	TRANSISTOR 2SC1364
Q201	8-729-663-48	TRANSISTOR 2SC1364-8
Q202	8-729-663-47	TRANSISTOR 2SC1364
Q203	8-729-663-47	TRANSISTOR 2SC1364
Q204	8-729-100-13	TRANSISTOR 2SC2001
Q205	8-729-663-48	TRANSISTOR 2SC1364-8
Q206	8-729-663-48	TRANSISTOR 2SC1364-8
Q207	8-729-100-13	TRANSISTOR 2SC2001
Q208	8-729-663-48	TRANSISTOR 2SC1364-8
Q209	8-729-663-48	TRANSISTOR 2SC1364-8
Q210	8-729-663-48	TRANSISTOR 2SC1364-8
Q211	8-729-663-47	TRANSISTOR 2SC1364
Q301	8-729-663-47	TRANSISTOR 2SC1364
Q302	8-729-663-47	TRANSISTOR 2SC1364
Q303	8-769-112-00	TRANSISTOR 2SK120
Q304	8-729-141-43	TRANSISTOR 2SD414
Q305	8-729-167-62	TRANSISTOR 2SC2676
Q306	8-729-167-62	TRANSISTOR 2SC2676
Q307	8-769-112-00	TRANSISTOR 2SK120
Q308	8-729-113-82	TRANSISTOR 2SA1138
Q309	8-729-113-82	TRANSISTOR 2SA1138
Q310	8-729-154-83	TRANSISTOR 2SB548
Q311	8-729-663-47	TRANSISTOR 2SC1364
Q312	8-729-663-47	TRANSISTOR 2SC1364
Q313	8-729-663-47	TRANSISTOR 2SC1364
Q314	8-729-663-47	TRANSISTOR 2SC1364
Q315	8-729-663-47	TRANSISTOR 2SC1364
Q316	8-729-612-77	TRANSISTOR 2SA1027R
Q317	8-729-612-77	TRANSISTOR 2SA1027R
Q318	8-729-612-77	TRANSISTOR 2SA1027R
Q319	8-729-612-77	TRANSISTOR 2SA1027R
Q320	8-729-663-47	TRANSISTOR 2SC1364
Q321	8-729-663-47	TRANSISTOR 2SC1364
Q322	8-729-612-77	TRANSISTOR 2SA1027R
Q323	8-729-612-77	TRANSISTOR 2SA1027R
Q324	8-729-663-48	TRANSISTOR 2SC1364-8
Q701	8-729-663-47	TRANSISTOR 2SC1364
Q702	8-729-663-47	TRANSISTOR 2SC1364

ELECTRICAL PARTS

Ref.No.	Part No.	Description
Q703	8-729-195-23	TRANSISTOR 2SA952
Q704	8-729-100-13	TRANSISTOR 2SC2001
Q705	8-729-195-23	TRANSISTOR 2SA952
Q706	8-729-100-13	TRANSISTOR 2SC2001
Q707	8-729-180-93	TRANSISTOR 2SD809
Q708	8-729-663-47	TRANSISTOR 2SC1364
Q709	8-729-177-43	TRANSISTOR 2SD774
Q710	8-729-177-43	TRANSISTOR 2SD774
Q711	8-729-663-47	TRANSISTOR 2SC1364
Q712	8-729-177-43	TRANSISTOR 2SD774
Q713	8-729-103-43	TRANSISTOR 2SB734
Q714	8-729-663-47	TRANSISTOR 2SC1364
Q715	8-729-612-77	TRANSISTOR 2SA1027R
Q716	8-729-663-47	TRANSISTOR 2SC1364
Q717	8-729-663-47	TRANSISTOR 2SC1364
Q718	8-729-663-47	TRANSISTOR 2SC1364
Q719	8-729-663-47	TRANSISTOR 2SC1364
Q720	8-729-663-47	TRANSISTOR 2SC1364
Q721	8-729-663-47	TRANSISTOR 2SC1364
Q722	8-729-663-47	TRANSISTOR 2SC1364
Q723	8-729-663-47	TRANSISTOR 2SC1364
Q724	8-729-663-47	TRANSISTOR 2SC1364
Q725	8-729-612-77	TRANSISTOR 2SA1027R
Q726	8-729-612-77	TRANSISTOR 2SA1027R
Q727	8-729-663-47	TRANSISTOR 2SC1364
Q728	8-729-663-47	TRANSISTOR 2SC1364
Q729	8-729-663-47	TRANSISTOR 2SC1364
Q730	8-729-663-47	TRANSISTOR 2SC1364
Q731	8-729-663-47	TRANSISTOR 2SC1364
Q732	8-729-180-93	TRANSISTOR 2SD809
Q733	8-729-103-43	TRANSISTOR 2SB734
Q734	8-729-180-93	TRANSISTOR 2SD809
Q735	8-729-663-47	TRANSISTOR 2SC1364
Q736	8-729-663-47	TRANSISTOR 2SC1364
Q737	8-729-663-47	TRANSISTOR 2SC1364
Q738	8-729-663-47	TRANSISTOR 2SC1364
Q739	8-729-663-47	TRANSISTOR 2SC1364
Q740	8-729-288-02	TRANSISTOR 2SD880
Q741	8-729-663-47	TRANSISTOR 2SC1364
Q742	8-729-663-47	TRANSISTOR 2SC1364
Q743	8-729-663-47	TRANSISTOR 2SC1364
Q744	8-729-663-47	TRANSISTOR 2SC1364
Q745	8-729-177-43	TRANSISTOR 2SD774
Q746	8-729-141-43	TRANSISTOR 2SD414
Q747	8-729-663-47	TRANSISTOR 2SC1364

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- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
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- MMH : mH, UH : μH

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SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
Q1000	8-729-100-13	TRANSISTOR 2SC2001			
Q1001	8-729-100-13	TRANSISTOR 2SC2001			
Q1002	8-729-100-13	TRANSISTOR 2SC2001			
Q1003	8-729-100-13	TRANSISTOR 2SC2001			
Q1004	8-729-100-13	TRANSISTOR 2SC2001			
Q1005	8-729-100-13	TRANSISTOR 2SC2001			
Q1006	8-729-100-13	TRANSISTOR 2SC2001			
Q1007	8-729-100-13	TRANSISTOR 2SC2001			
Q1051	8-729-180-93	TRANSISTOR 2SD809			
Q1052	8-729-993-72	TRANSISTOR 2SA937			
Q1053	8-729-463-73	TRANSISTOR 2SD637			
Q1054	8-729-993-72	TRANSISTOR 2SA937			
Q1055	8-729-463-73	TRANSISTOR 2SD637			
Q1058	8-729-993-72	TRANSISTOR 2SA937			
Q1059	8-729-463-73	TRANSISTOR 2SD637			
Q1060	8-729-993-72	TRANSISTOR 2SA937			
Q1061	8-729-463-73	TRANSISTOR 2SD637			
R24	1-214-149-00	METAL	5.1K	1%	1/4W
R25	1-214-144-00	METAL	3.3K	1%	1/4W
R26	1-214-150-00	METAL	5.6K	1%	1/4W
R27	1-214-132-00	METAL	1K	1%	1/4W
R31	⚠1-206-475-00	METAL	33	5%	2W F
R40	1-214-137-00	METAL	1.6K	1%	1/4W
R70	⚠1-212-849-00	FUSIBLE	4.7	5%	1/4W F
R71	1-246-505-00	CARBON	22K	5%	1/4W
R73	⚠1-202-851-00	COMPOSITION	3.3		1/4W F
R101	1-214-911-00	METAL	82K	1%	1/2W
R102	1-214-842-00	METAL	120	1%	1/2W
R103	1-214-780-00	METAL	130K	1%	1/4W
R104	1-214-882-00	METAL	7.5K	1%	1/2W
R105	1-214-737-00	METAL	2.2K	1%	1/4W
R107	1-214-739-00	METAL	2.7K	1%	1/4W
R109	1-214-737-00	METAL	2.2K	1%	1/4W
R111	1-214-743-00	METAL	3.9K	1%	1/4W
R112	1-214-777-00	METAL	100K	1%	1/4W
R124	1-214-754-00	METAL	11K	1%	1/4W
R125	1-214-751-00	METAL	8.2K	1%	1/4W
R126	1-214-747-00	METAL	5.6K	1%	1/4W
R129	1-214-755-00	METAL	12K	1%	1/4W
R130	1-214-742-00	METAL	3.6K	1%	1/4W
R131	1-214-689-00	METAL	22	1%	1/4W
R132	1-214-749-00	METAL	6.8K	1%	1/4W
R133	1-214-769-00	METAL	47K	1%	1/4W
R134	1-214-905-00	METAL	47K	1%	1/2W

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R135	1-214-768-00	METAL	43K	1%	1/4W
R137	1-214-729-00	METAL	1K	1%	1/4W
R138	1-214-747-00	METAL	5.6K	1%	1/4W
R139	1-214-749-00	METAL	6.8K	1%	1/4W
R142	1-214-777-00	METAL	10K	1%	1/4W
R143	1-214-777-00	METAL	10K	1%	1/4W
R150	1-214-758-00	METAL	16K	1%	1/4W
R156	1-214-964-00	METAL	1M	1%	1/4W
R165	1-214-777-00	METAL	10K	1%	1/4W
R167	1-214-737-00	METAL	2.2K	1%	1/4W
R168	1-214-739-00	METAL	2.7K	1%	1/4W
R170	1-214-753-00	METAL	10K	1%	1/4W
R171	1-214-741-00	METAL	3.3K	1%	1/4W
R175	1-214-967-00	METAL	1.3M	1%	1/4W
R177	1-214-758-00	METAL	16K	1%	1/4W
R180	1-214-766-00	METAL	36K	1%	1/4W
R181	1-214-729-00	METAL	1K	1%	1/4W
R250	1-214-758-00	METAL	16K	1%	1/4W
R256	1-214-964-00	METAL	1M	1%	1/4W
R265	1-214-777-00	METAL	10K	1%	1/4W
R267	1-214-737-00	METAL	2.2K	1%	1/4W
R268	1-214-739-00	METAL	2.7K	1%	1/4W
R270	1-214-753-00	METAL	10K	1%	1/4W
R271	1-214-741-00	METAL	3.3K	1%	1/4W
R275	1-214-967-00	METAL	1.3M	1%	1/4W
R277	1-214-758-00	METAL	16K	1%	1/4W
R280	1-214-766-00	METAL	36K	1%	1/4W
R281	1-214-729-00	METAL	1K	1%	1/4W
R282	1-214-733-00	METAL	1.5K	1%	1/4W
R285	1-214-746-00	METAL	5.1K	1%	1/4W
R286	1-214-728-00	METAL	910	1%	1/4W
R287	1-214-713-00	METAL	220	1%	1/4W
R288	1-214-741-00	METAL	3.3K	1%	1/4W
R291	1-214-753-00	METAL	10K	1%	1/4W
R292	1-214-729-00	METAL	1K	1%	1/4W
R301	1-214-721-00	METAL	470	1%	1/4W
R302	1-214-721-00	METAL	470	1%	1/4W
R307	1-244-849-00	CARBON	100	5%	1/2W
R308	1-244-849-00	CARBON	100	5%	1/2W
R309	1-244-849-00	CARBON	100	5%	1/2W
R310	1-244-849-00	CARBON	100	5%	1/2W
R311	1-244-849-00	CARBON	100	5%	1/2W
R321	1-214-863-00	METAL	910	1%	1/2W
R322	1-214-867-00	METAL	1.3K	1%	1/2W
R323	1-214-867-00	METAL	1.3K	1%	1/2W

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RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R324	1-214-863-00	METAL	910	1%	1/2W
R325	1-214-751-00	METAL	8.2K	1%	1/4W
R326	1-214-751-00	METAL	8.2K	1%	1/4W
R335	1-214-757-00	METAL	15K	1%	1/4W
R336	1-214-740-00	METAL	3K	1%	1/4W
R345	1-246-498-00	CARBON	11K	5%	1/4W
R346	1-214-757-00	METAL	15K	1%	1/4W
R347	1-214-740-00	METAL	3K	1%	1/4W
R402	1-214-872-00	METAL	2.2K	1%	1/2W
R403	1-214-788-00	METAL	300K	1%	1/4W
R406	1-214-785-00	METAL	220K	1%	1/4W
R411	1-214-750-00	METAL	7.5K	1%	1/4W
R546	1-214-716-00	METAL	300	1%	1/4W
R548	1-214-166-00	METAL	27K	1%	1/4W
R550	1-214-159-00	METAL	13K	1%	1/4W
R552	1-214-158-00	METAL	12K	1%	1/4W
R561	1-206-664-00	METAL OXIDE	1K		2W
R574	1-214-758-00	METAL	16K	1%	1/4W
R575	1-214-758-00	METAL	16K	1%	1/4W
R576	1-214-758-00	METAL	16K	1%	1/4W
R577	1-214-758-00	METAL	16K	1%	1/4W
R578	1-214-758-00	METAL	16K	1%	1/4W
R579	1-214-736-00	METAL	2K	1%	1/4W
R580	1-214-736-00	METAL	2K	1%	1/4W
R581	1-214-736-00	METAL	2K	1%	1/4W
R582	1-214-729-00	METAL	1K	1%	1/4W
R723 ⚠	1-212-849-00	FUSIBLE	4.7	5%	1/4W F
R730	1-214-149-00	METAL	5.1K	1%	1/4W
R731	1-214-171-00	METAL	43K	1%	1/4W
R734	1-214-151-00	METAL	6.2K	1%	1/4W
R735	1-214-165-00	METAL	24K	1%	1/4W
R736	1-214-153-00	METAL	7.5K	1%	1/4W
R802	1-214-872-00	METAL	2.2K	1%	1/2W
R803	1-214-788-00	METAL	300K	1%	1/4W
R806	1-214-785-00	METAL	220K	1%	1/4W
R901	1-214-777-00	METAL	10K	1%	1/4W
R905	1-214-960-00	METAL	680K	1%	1/4W
R908	1-214-960-00	METAL	680K	1%	1/4W
R911	1-214-743-00	METAL	3.9K	1%	1/4W
R914	1-214-743-00	METAL	3.9K	1%	1/4W
R950 ⚠	1-217-379-00	FUSIBLE	2.2	5%	1/4W F
R951 ⚠	1-217-379-00	FUSIBLE	2.2	5%	1/4W F

ELECTRICAL PARTS

Ref.No.	Part No.	Description
RV101	1-228-542-00	RES, ADJ, METAL GLAZE 10K
RV102	1-226-236-00	RES, ADJ, CARBON 10K
RV103	1-228-239-00	RES, ADJ, METAL GLAZE 50K
RV104	1-226-237-00	RES, ADJ, CARBON 20K
RV201	1-228-542-00	RES, ADJ, METAL GLAZE 10K
RV202	1-226-236-00	RES, ADJ, CARBON 10K
RV203	1-228-239-00	RES, ADJ, METAL GLAZE 50K
RV204	1-226-237-00	RES, ADJ, CARBON 20K
RV301	1-226-232-00	RES, ADJ, CARBON 500
RV302	1-226-232-00	RES, ADJ, CARBON 500
RV701	1-226-233-00	RES, ADJ, CARBON 1K
RV901	1-226-759-00	RES, ADJ, METAL GLAZE 50K
RY701 ⚠	1-515-450-00	RELAY
S601	1-552-532-00	SWITCH, PUSH
S602	1-552-532-00	SWITCH, PUSH
S603	1-552-532-00	SWITCH, PUSH
S604	1-552-532-00	SWITCH, PUSH
S701	1-553-638-00	SWITCH, SLIDE
S1001	1-553-636-00	SWITCH, MICRO
T701 ⚠	1-447-307-00	(US,Canadian)...TRANSFORMER, POWER
T701 ⚠	1-447-310-00	(AEP,UK).....TRANSFORMER, POWER
T701 ⚠	1-447-316-00	(E).....TRANSFORMER, POWER
T702 ⚠	1-447-308-00	(US,Canadian)...TRANSFORMER, POWER
T702 ⚠	1-447-309-00	(AEP,UK).....TRANSFORMER, POWER
T702 ⚠	1-447-315-00	(E).....TRANSFORMER, POWER

NOTE:
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part numbers (Δ-ΔΔΔ-ΔΔΔ-XX or Δ-ΔΔΔΔ-ΔΔΔ-X) may be different from those used in the set.

CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

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SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC, UPD···: μPD···

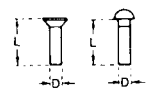
1/4 WATT CARBON RESISTORS

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw: P 3 x 10

- *L: Length in mm*
- *D: Diameter in mm*
- *Type of head*
- *Indicated slotted-head only.*
- *Unless otherwise indicated, it means cross-recessed head (Phillips type).*



Nut, Washer, Retaining ring: N 3

- *Diameter of usable screw or shaft*
- *Reference designation*

Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazier-head screw	

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	

Sony Corporation
Audio & Video Group

English
82I0412-1
Printed in Japan

STEREO CASSETTE DECK

TC-FX1010

US Model
Canadian Model
AEP Model
UK Model
E Model

SUPPLEMENT

File this supplement with the service manual.

CIRCUIT DESCRIPTION

No. 1
Aug., 1982

TABLE OF CONTENTS

MICROFILM

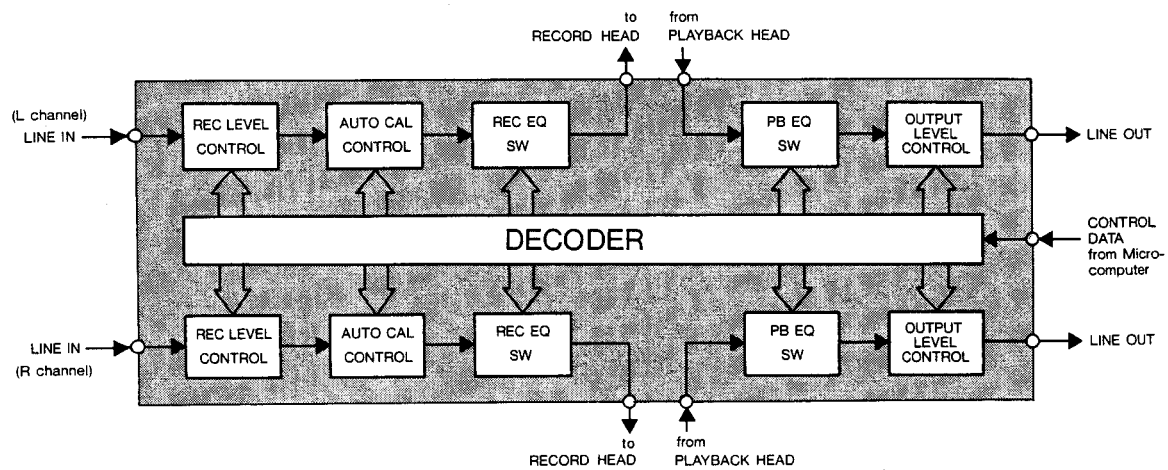
SONY®
SERVICE MANUAL

1. Technical Information

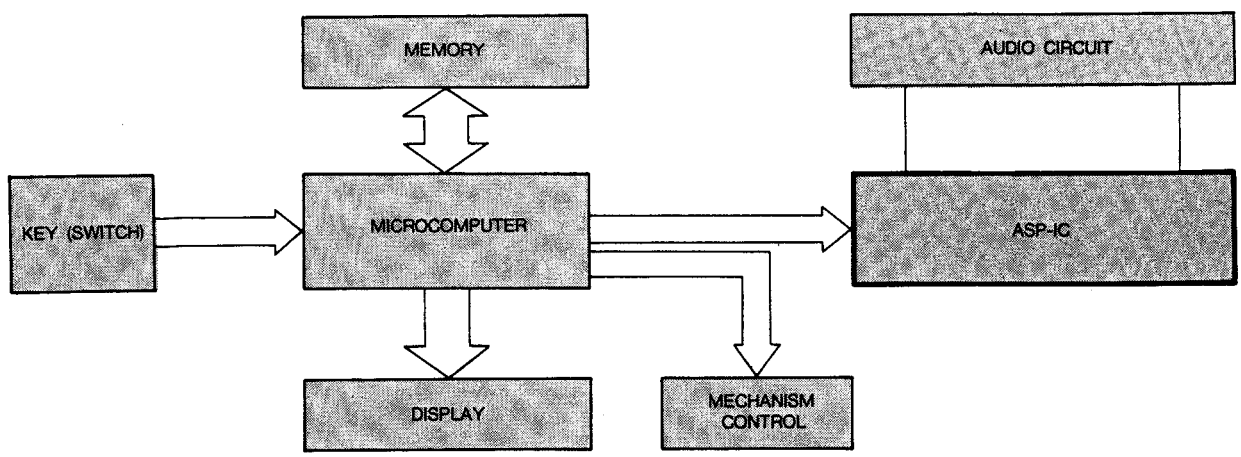
ASP (Audio Signal Processor) IC

Sony has developed a new IC, called an ASP IC, which can control all the functions of the TC-FX1010 and which greatly simplifies and shortens the signal path. This new IC makes it possible to eliminate all mechanical controls and switches from the front panel.
The ASP IC, in conjunction with the TC-FX1010's built-in microcomputer, offers more useful and easy-to-operate funcitons than ever before—status memory function, auto calibration, auto recording level attenuation, etc.

ASP IC block diagram



System control diagram



DOLBY NR (NOISE REDUCTION) SYSTEM

There have been until recently just two types of Dolby NR system: the A-type for professional use, and the B-type, a simplified version of the A-type, employed by most consumer-grade cassette decks. Now, a third type of Dolby NR system is available, the C-type. The C-type system reduces tape noise much more effectively than the B-type system.

The basis of the Dolby NR system

During recording, low-level high-frequency signals, which tend to be obscured by tape hiss, are boosted so that they are substantially higher in level than any tape noise. When these signals are played back, the level is lowered to the original input level, while simultaneously the level of any tape noise is reduced to the same extent.
The Dolby B-type NR system thus reduces tape noise by 10 dB at 5 kHz. The C-type system reduces noise by 20 dB at 5 kHz. The Dolby C-type NR system also begins to take effect at frequencies lower than the B-type system.

Anti-saturation network

Normally, recording tape will saturate more easily at the higher frequencies. The Dolby C-type NR system incorporates a high frequency anti-saturation network. During recording, the anti-saturation network automatically reduces high-level high-frequency signals. When these signals are played back, the level is automatically boosted to the original input level. At 10 kHz, the tendency of the tape to saturate is reduced by 4 dB by the use of this network.

Playback of Dolby NR encoded tapes

For the best sound, lowest distortion, and most effective noise reduction, it is essential that a tape recorded using either the B-type or the C-type Dolby NR system be played back using the same system that was used during the recording process. We recommend that you label the cassettes you record as being either non-Dolby NR, Dolby B NR, or Dolby C NR.

Fig. 1 Encoding characteristics

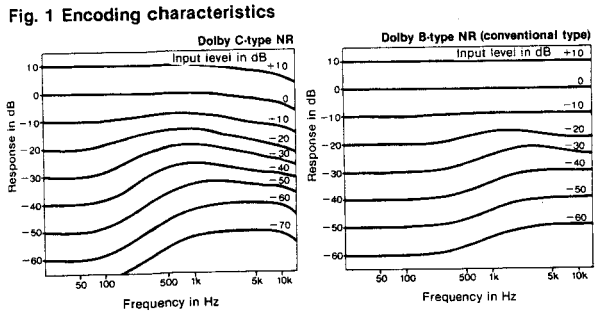


Fig. 2 Noise improvement

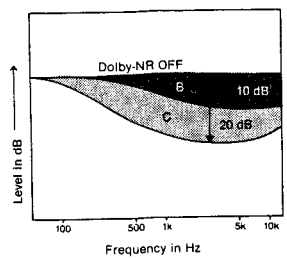
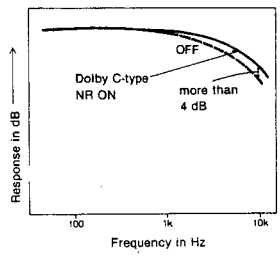


Fig. 3 Saturation level improvement



AUTOMATIC CALIBRATION

The TC-FX1010's auto tape select system detects the type of cassette tape inserted and selects the recording settings appropriate for that type of tape. This is useful since the recording characteristics of a type II tape, for example, of one manufacturer may be significantly different from those of another manufacturer. The automatic calibration system works as follows:

Bias calibration

To obtain the widest possible frequency response, the automatic calibration system first adjusts the bias current. Normally, too high a bias level gives a rolled-off high-frequency response, and too little bias reduces the signal-to-noise ratio and increases distortion. The automatic calibration system first records 8 kHz and 400 Hz test tones, then plays them back, adjusting the bias current so that the playback levels of the 8 kHz and 400 Hz test tones are the same.

Recording sensitivity calibration

If the sensitivity of the tape being used is different from the sensitivity of the tape which was used to adjust the unit at the factory, the playback level may differ from the recording level. The automatic calibration system compensates for any difference in sensitivity by adjusting the recording and playback level of a 400 Hz test tone so that the recording and playback levels are the same. This precise calibration of the recording sensitivity serves to optimize the performance of the Dolby NR system, which is most effective when the recording and playback levels are the same.

The setting of the keys during automatic calibration

When you begin automatic calibration, the setting of the following keys on the front panel will cange to:

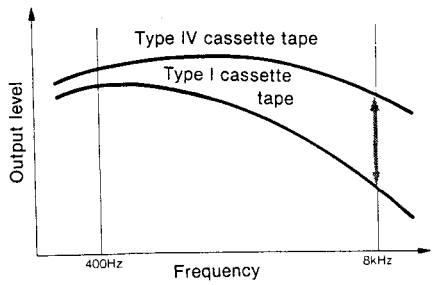
REC LEVEL: 10 ATT dB REC BALANCE: center DOLBY NR: OFF
MPX FILTER: OFF MOL BALANCE: NORM

When calibration is finished, all keys except for the MOL BALANCE key will return to their previous setting.

AUTOMATIC RECORDING LEVEL ATTENUATION

When the AUTO ATT key is set to ON, the TC-FX1010 attenuates the recording level if an input level higher than the MOL (Maximum Output Level) that comes in during recording. The MOL varies with type of tape and the frequency range. The MOL of a type I cassette in the high-frequency range, for example, is much lower than the MOL of a type IV cassette in the high-frequency range, as is shown in the figures below.

MOL change with frequency



The TC-FX1010 stores in its memory the standard MOL of each of the four types of tape in the high-frequency range and low-frequency range. During recording, the input signals are divided into high- or low-frequncy range and their level is compared with the memorized MOL. If their level exceeds the MOL, the automatic attenuator lowers the recording level. After the recording level has been lowered, it does not return to the original level.

MOL BALANCE

Using the auto tape select system and the auto calibration system, the optimum recording settings for standard program sources can be obtained. The MOL BALANCE key permits you to adjust the recording settings to suit particular program sources.

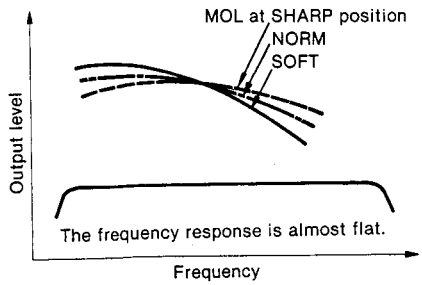
The MOL BALANCE key sets the MOL by adjusting the bias current. To maintain a flat frequency response the recording equalization characteristics are adjusted simultaneously. The MOL BALANCE key has the following 3 positions.

NORM : Normal setting.

SHARP : The bias level is lowered, so the MOL in the high-frequency range is raised. This setting is appropriate for recording high-frequency range programs, such as jazz or synthesizer music.

SOFT : The bias level is raised, so the MOL in the low-frequency range is raised. This setting is appropriate for recording low-frequency range programs, such as classical music.

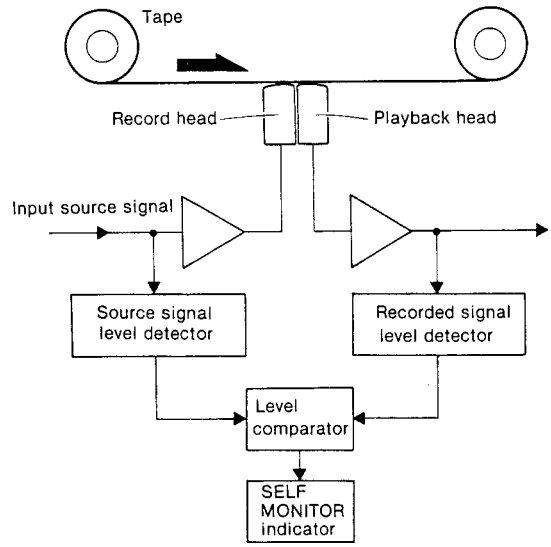
Since there is no fixed rule for setting the MOL BALANCE key, set it to the position that seems right for your listening conditions.



SELF MONITOR SYSTEM

The TC-FX1010 compares the levels of the input source signal and the recorded signal during recording. The SELF MONITOR indicator flickers to warn if the recorded signal level is lower than the source signal level, a situation which can be caused by a contaminated head or saturation of the tape.

- If the difference between source signal level and the recorded signal level is more than 3 dB . . . . . the white indicator flickers.
- If the difference is more than 6 dB . . . . . the white and red indicators flicker.



2. Function of IC703, 704

IC703, 704 are microcomputer ICs. The functions of the terminals are shown below.

2-1. Main functions of IC703

- Key input detection
- LED, FL tube indication output
- Mech deck control signal control

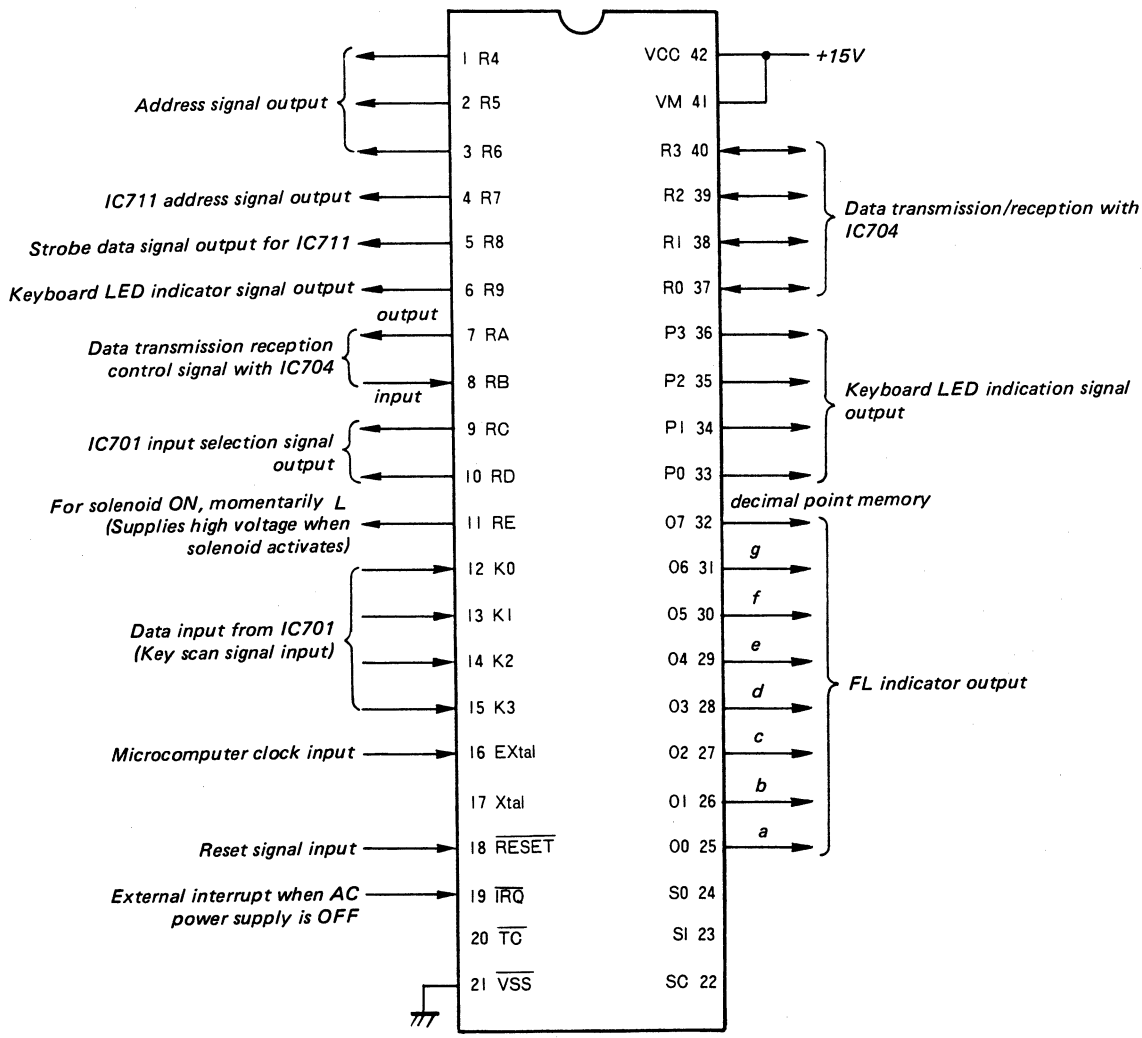


Fig. 1

2-2. Main functions of IC704

- Data transmission (16 bit serial data) to ASP IC (IC309, CX-7919)
- Level detection circuit control
- RAM data back-up when AC power supply is OFF

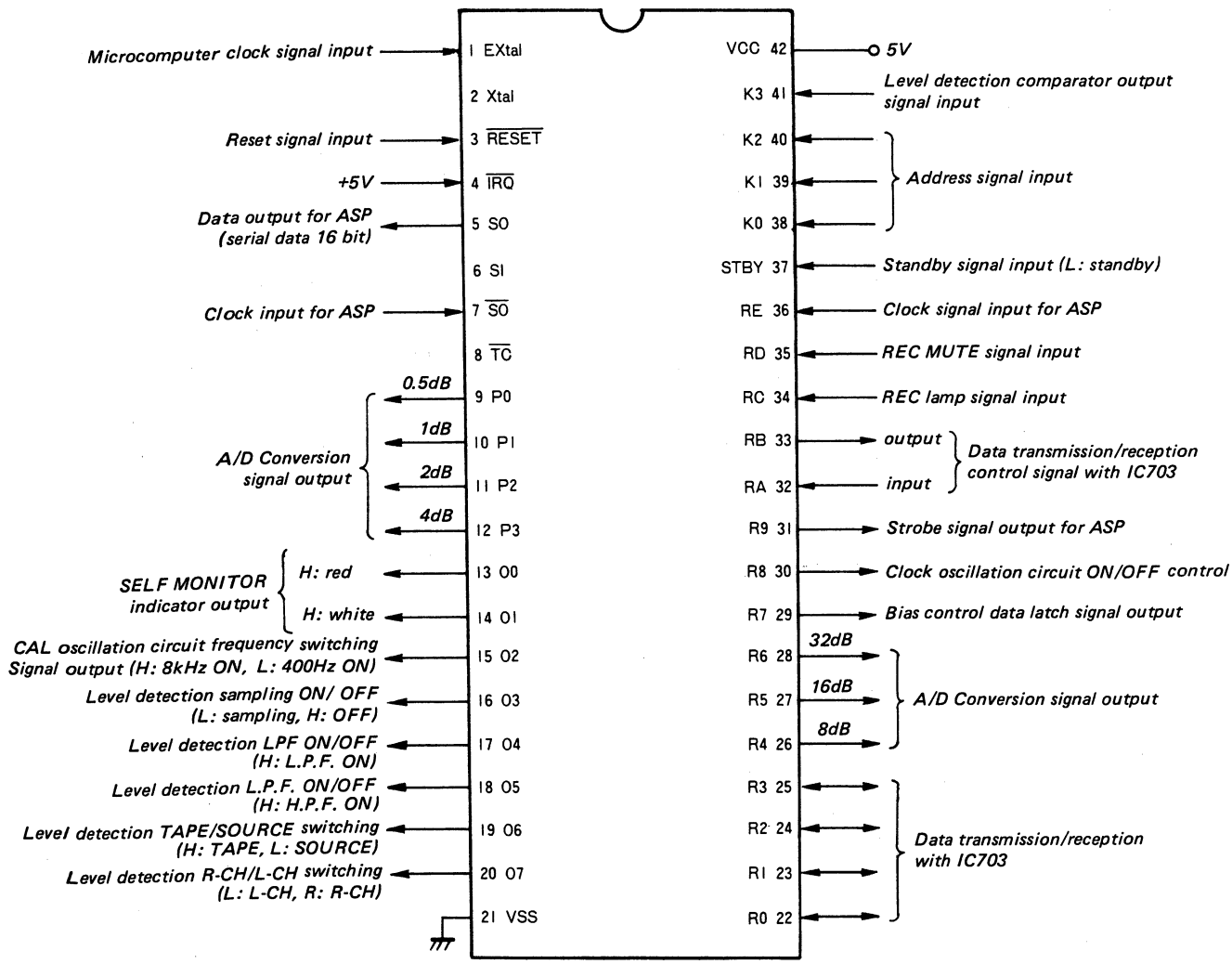


Fig. 2

3. Keyboard Input

This is a circuit diagram of the keyboard input section.

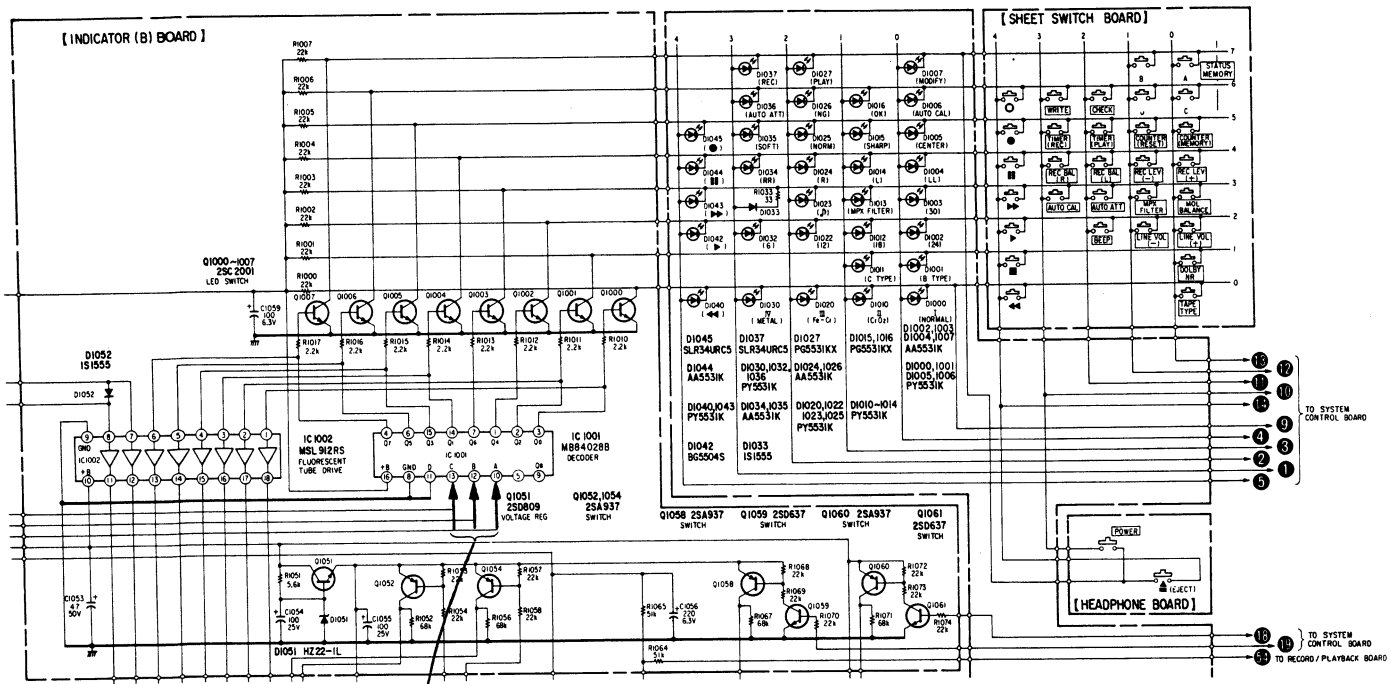


Fig. 3

3 bit address signal from IC703 (microcomputer) is applied to IC1001 pins (10) , (12) , (13) . (000 – 111 signal)

IC1001 converts the BCD code to 10 decimal, and corresponds to input to make one of Q0 – Q7 go high.

The signal from IC703 inputs its maximum weight to A, medium weight to C, and its minimum weight to B.

Table 1 indicates the correspondence to input/ output.

IC1001

Signal from IC703			Input			Output		
MSB	Medium	LSB	C	B	A	No. of Pin which goes H		
0	0	0	0	0	0	Q0	③	Q1000
0	0	1	0	1	0	Q2	②	
0	1	0	1	0	0	Q4	①	
0	1	1	1	1	0	Q4	⑦	
1	0	0	0	0	1	Q1	⑭	
1	0	1	0	1	1	Q3	⑮	
1	1	0	1	0	1	Q5	⑥	
1	1	1	1	1	1	Q7	④	Q1007

Table 1

In this way Q1000 – Q1007 go ON successively. As shown in Fig. 4, it determines which key has been pressed and switches to that operation.

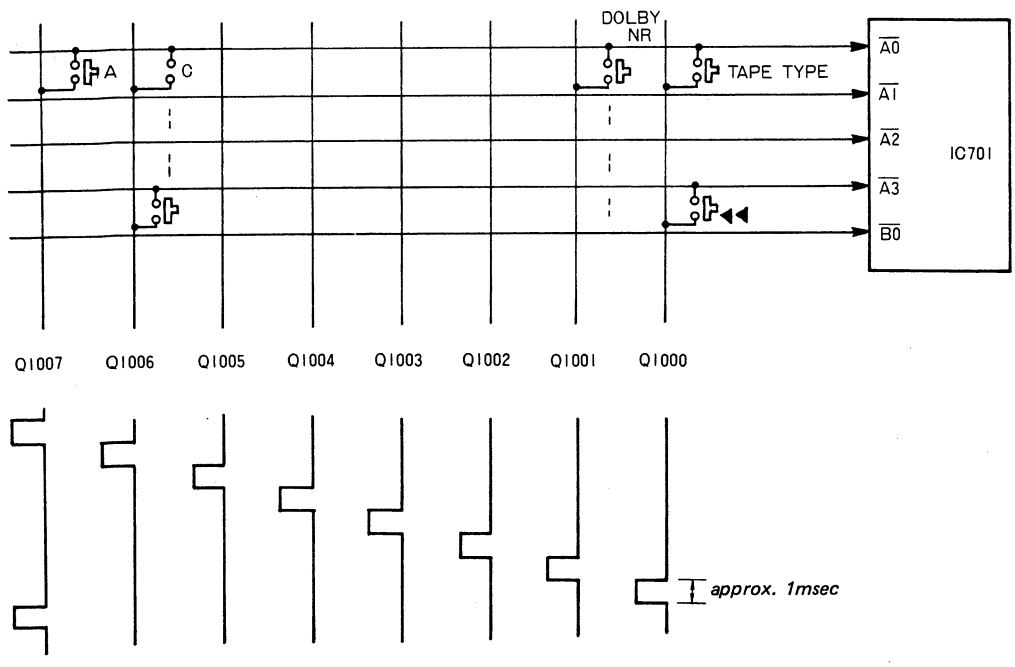


Fig. 4

4. IC701 (input enlarging IC)

Fig. 5 shows IC701 input/output ports.

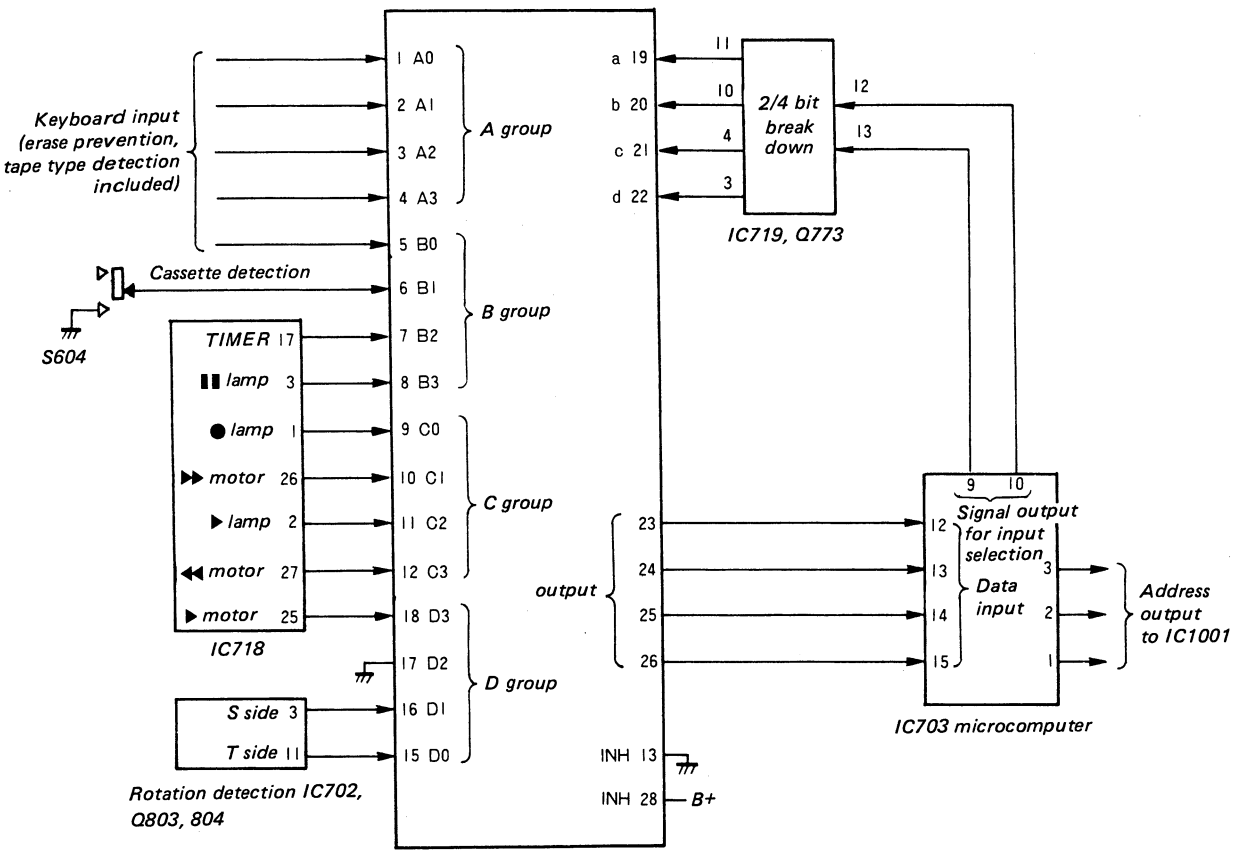


Fig. 5

5. Function of IC719

IC719 breaks down the 2 bit signal from IC703 pins ⑨, ⑩ to a 4 bit signal.
This signal is applied to IC701.
Fig. 6 is its circuit diagram.

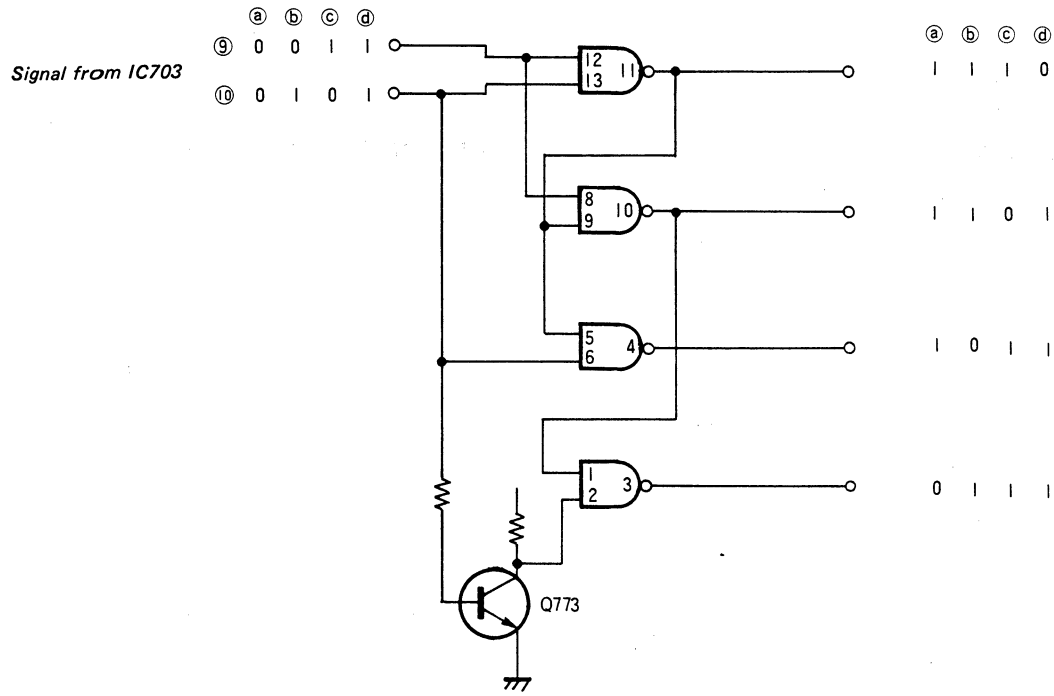


Fig. 6

The 4 bit signal made at IC719 is applied to IC701 pins ⑲ – ㉒ . With this signal, the data of IC701 input A group – D group is led, and then output from pins ㉓ – ㉖ .
This is illustrated in table 2.

IC703		IC701 selection signal				IC701 output
⑨	⑩	⑲	⑳	㉑	㉒	㉓ – ㉖
0	0	1	1	1	0	D group (⑮ – ⑱ input)
0	1	1	1	0	1	C group (⑨ – ⑫ input)
1	0	1	0	1	1	B group (⑤ – ⑧ input)
1	1	0	1	1	1	A group (① – ④ input)

Table 2

The following symptoms occur when the signals are not applied to the respective IC701 input terminals. (constant high)

① ---------- Even if a side key (A, C, COUNTER / MEMORY , etc.) is pressed, there is no operation.
② ---------- Even if a side key (B, D, etc.) is pressed, there is no operation.
⑤ ---------- Even if a side key (▲, ■, ●, etc.) is pressed, there is no operation.
⑥ ---------- The entire mechanical section does not operate.
⑦ ---------- Except for the mechanical section, all lamps light up.
⑧ – ⑫, ⑱ --- Lamp lighting and operations are not normal.
⑮, ⑯ ----- Count is delayed. It takes 2 – 3 times the normal time to count up. If the signal is not applied to both terminals, there is no count.

6. IC711 (output enlarging IC)

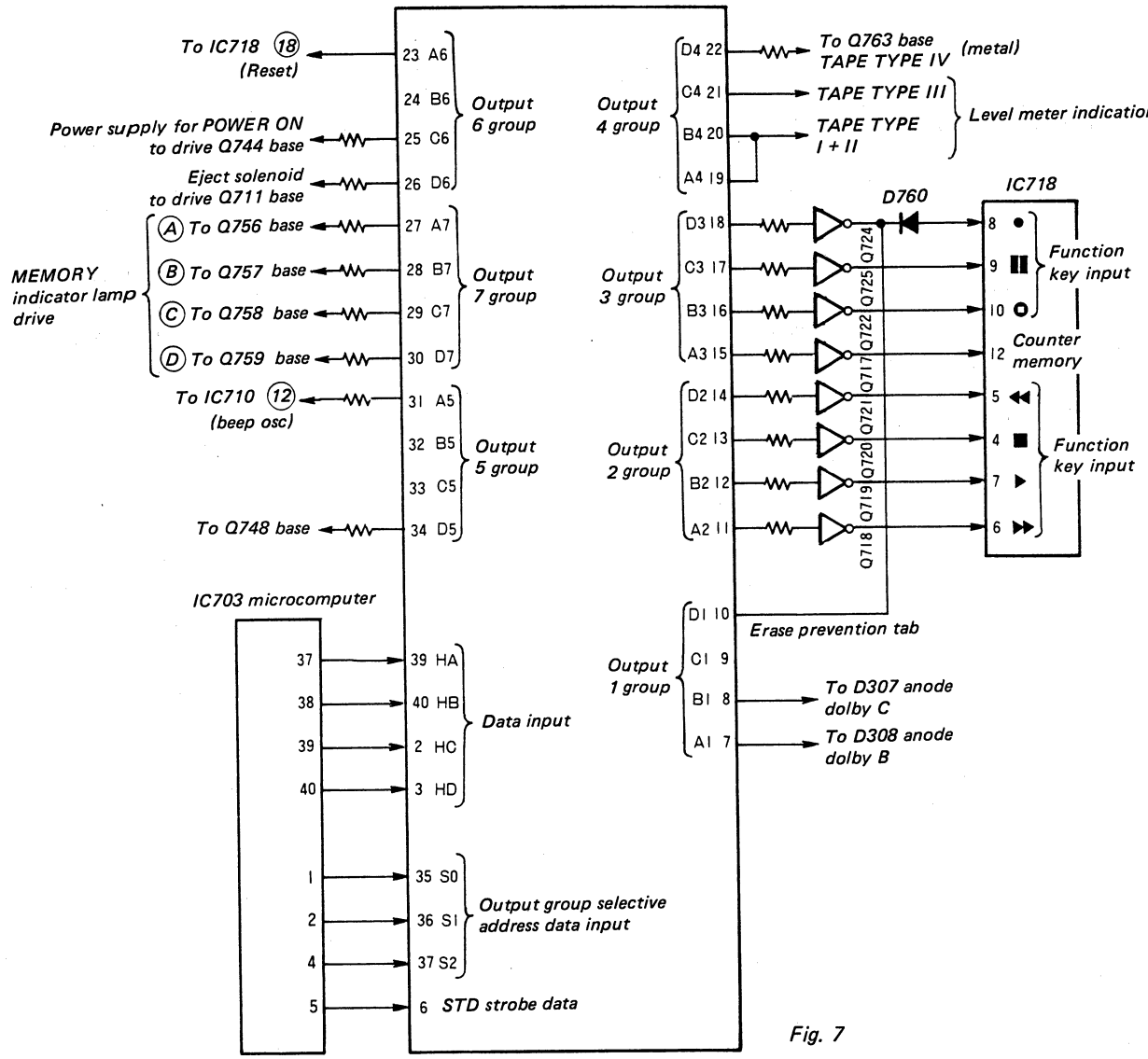


Fig. 7

The address signals and data strobe signals from IC703 are input to IC711.

The address signal determines which output group to output the data to, and when the strobe data pulse is high, that data is output.

When the strobe data pulse is low, the output is latched.

The address signals use the lower 2 bits and most significant bit from the 4 bit output from IC703. (The S2 signal is made independently by IC703.)

The strobe signal and address signals waveform diagram is given in Fig. 8.

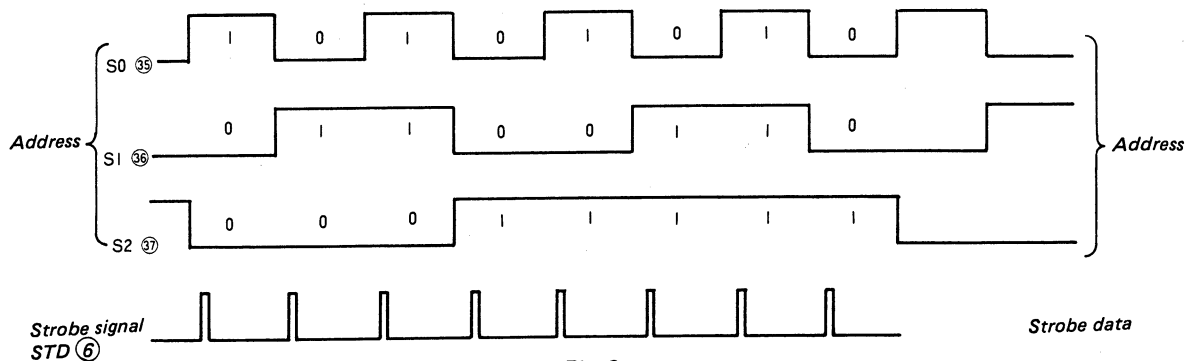


Fig. 8

IC711 Terminals

Address			Output			
S2 (37)	S1 (36)	S0 (35)	A	B	C	D
0	0	1	(7) H for DOLBY B	(8) H for DOLBY C	(9) not used	(10) Goes L for 4 sec, after power ON when TIMER is on REC, then goes H. Goes H if erase prevention tab is broken.
0	1	0	(19), (20) H when TAPE TYPE is CrO_2 and NORMAL.		(21) H when TAPE TYPE is NORMAL/FeCr/CrO_2	(22) H only when TAPE TYPE is METAL
			Red indication on lower right of indicator tube → goes out only when METAL; goes out only when FeCr		all light up for CrO_2, NORMAL	
0	1	1	(31) H momentarily when BEEP switch is ON and another SW is pressed (except mechanical key)	(32) not used	(33) not used	(34) H only when AUTO CAL is pressed. H during AUTO CAL operation; turns on CAL oscillation circuit
1	0	0	(11) H for FF	(12) H for FWD. H momentarily for 4 sec, after POWER ON when TIMER is on PLAY or REC, then L.	(13) H for STOP	(14) H for REW
1	0	1	(15) H momentarily at 000 during REW. (when MEMORY key was pressed)	(16) H for REC MUTE	(17) H for PAUSE	(18) H for REC. H for 4 sec. after POWER ON when TIMER is at REC, then L.
1	1	0	(23) RESET signal Normally H. L for POWER OFF.	(24) not used	(25) Relay drive H for POWER ON	(26) H for approx. 0.5 sec. when EJECT button is pressed.
1	1	1	(27) H when STATUS MEMORY key A is pressed.	(28) H when STATUS MEMORY key B is pressed.	(29) H when STATUS MEMORY key C is pressed.	(30) H when STATUS MEMORY key D is pressed.

Table 3

7. ASP (Audio Signal Processor) IC: IC309 (CX7919)

The many variable resistors and switches conventionally used for tape deck signal control are built into this IC, and digital volume and electronic switches take their places.

These controls are performed by digital signals, and in this model, are all controlled by IC704 (microcomputer).

The ASP IC is controlled by the data, clock and strobe data signals.

The data is constructed as 16 bits to 1 group, and there are 4 such groups. (See Fig. 10)

These 4 groups of data are sent constantly from IC704 (micon) to IC309 (ASP IC).

The ASP IC data is applied to ASP IC in serial. The data is led inside ASP IC by the rise in the clock signal, and when it drops, the next data is output from IC704. When the 16 bit signal is sent inside the ASP IC, a strobe pulse is output from IC704. The data inside the ASP IC is latched by the strobe pulse.

The latching location is determined by the values of the 3 highest bits, the data is latched there, and the switches and volumes are controlled by that data. Fig. 9 is its timing chart.

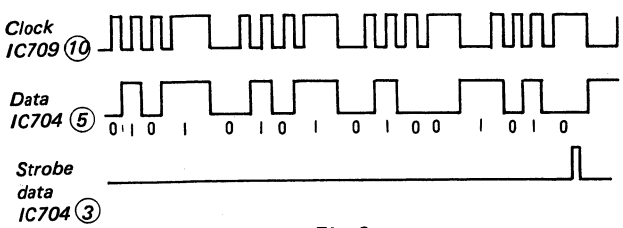


Fig. 9

1 group is formed by 4 bits each being output 4 times. When 4 bits are sent, the clock is stopped once (clock cycle lengthens) so that the next 4 bits are output.

Transmission of data to the ASP IC begins 4 seconds after POWER ON.

ASP Control Data

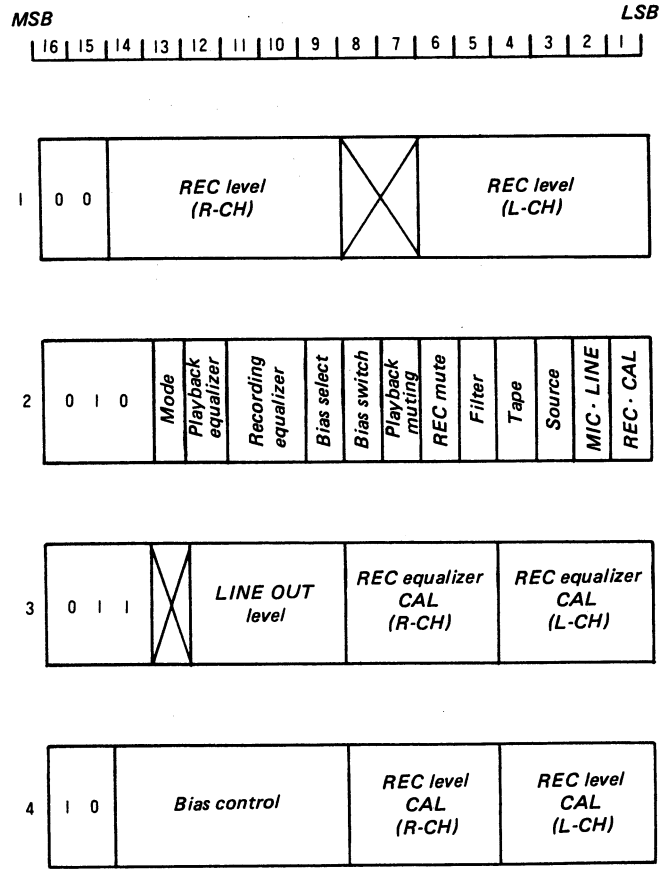


Fig. 10

☒ is not used.

Divided into 4 groups at bits 16, 15 or 14.

8. ASP Signal Level Shift

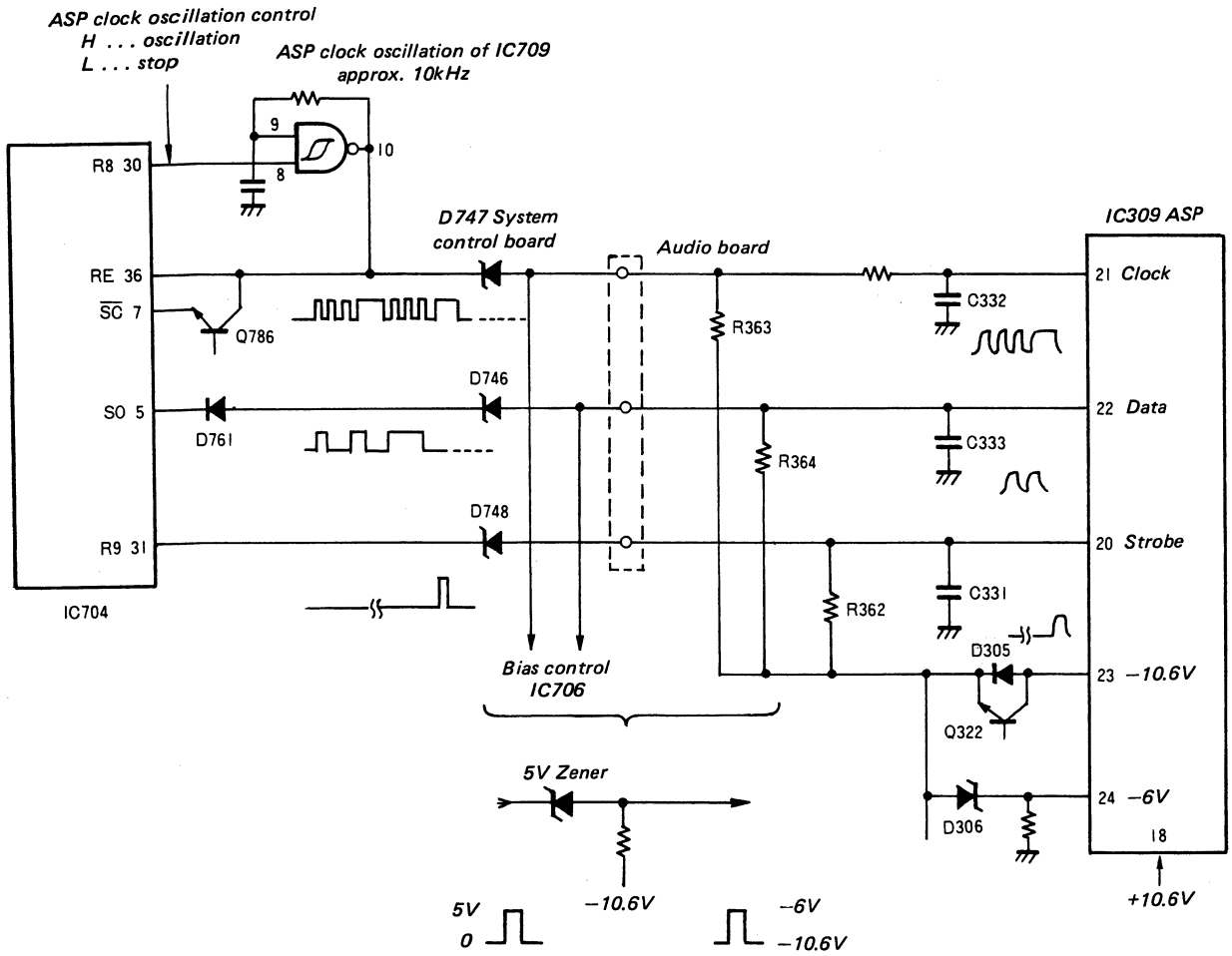


Fig. 11

On the ASP IC, the 5V line between pins (23) and (24) is the logic input level, so the 0 – 5V signal on the micon side is level shifted 11V by the Zener diode and applied to the ASP IC signal input.

Also, to prevent the noise from jumping into the audio section during pulse rise and fall, the waveform is rounded at C331 – 333.

The ASP IC clock signal is formed in the IC709 oscillation circuit. (approx. 10kHz)

This oscillation circuit is controlled by the IC704 (30) signal, which stops oscillation once at the fourth wave in the clock signal.

This signal is led into IC704 (7) and 4 bits each of data from the microcomputer serial buffer are output from (5).

9. Bias Control

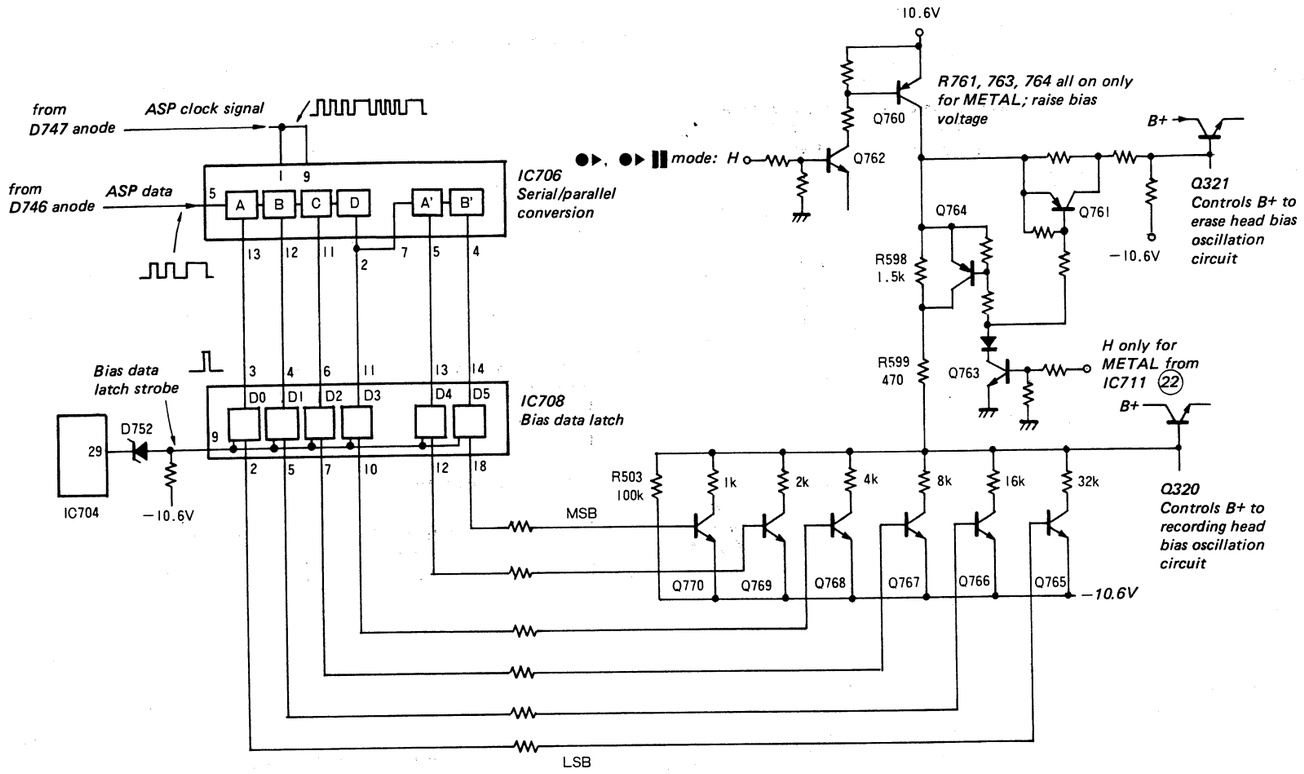


Fig. 12

Bias control turns on the Q765 – 770 transistors, and by that combination, controls the Q320 (B+ supply to bias oscillation circuit) base voltage to control the B+ to the bias circuit, and controls recording frequency response.

IC708, 706 turn Q765 – 770 ON/OFF, and the data sent from IC704 to IC309 (ASP) is applied to IC706. From this data, 6 bits of data for bias control are led in serially, made parallel and sent to IC708. Just at the point where 6 bits of bias control data (see page 13 ASP control data) are led into IC706 shift register, the bias data latch signal from IC704 pin (29) is applied to IC708 pin (9), and the bias data is transmittted to Q765 – 770 base. IC708 is a D-type flip-flop, and only when pin (9) is high, the parallel data is transmitted from IC706 to Q765 – 770.

10. Level Detection Circuit

Detects audio signal level and performes the operation for AUTO CAL, AUTO ATT, SELF MONITOR. The block diagram of the level detection circuit is shown in Fig. 13.

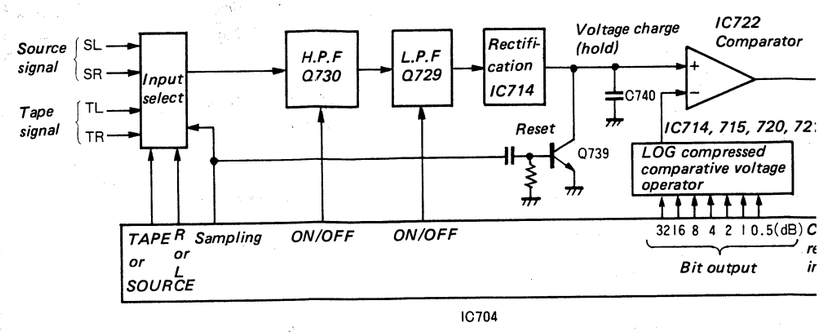
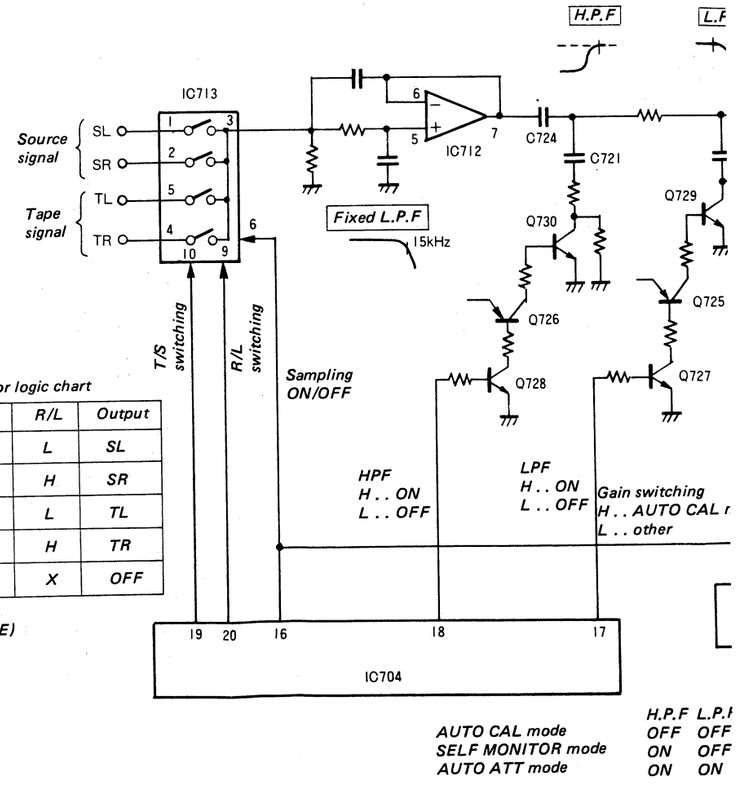


Fig. 13

Audio Signal DC Circuit Diagram



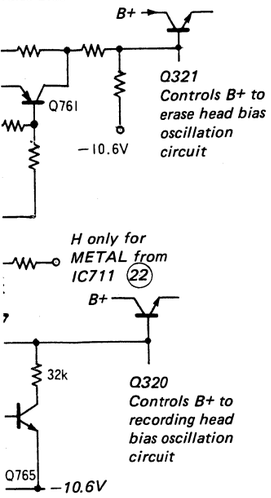
IC713 input selector logic chart

Sampling	T/S	R/L	Output
L	L	L	SL
L	L	H	SR
L	H	L	TL
L	H	H	TR
H	X	X	OFF

(X is DON'T CARE)

Fig. 14

764 all on only raise bias



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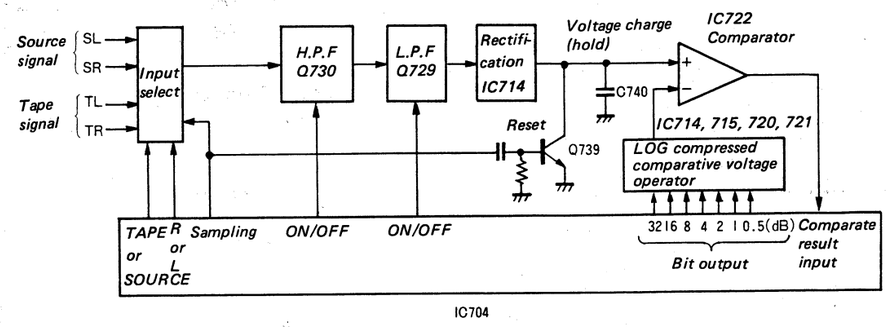


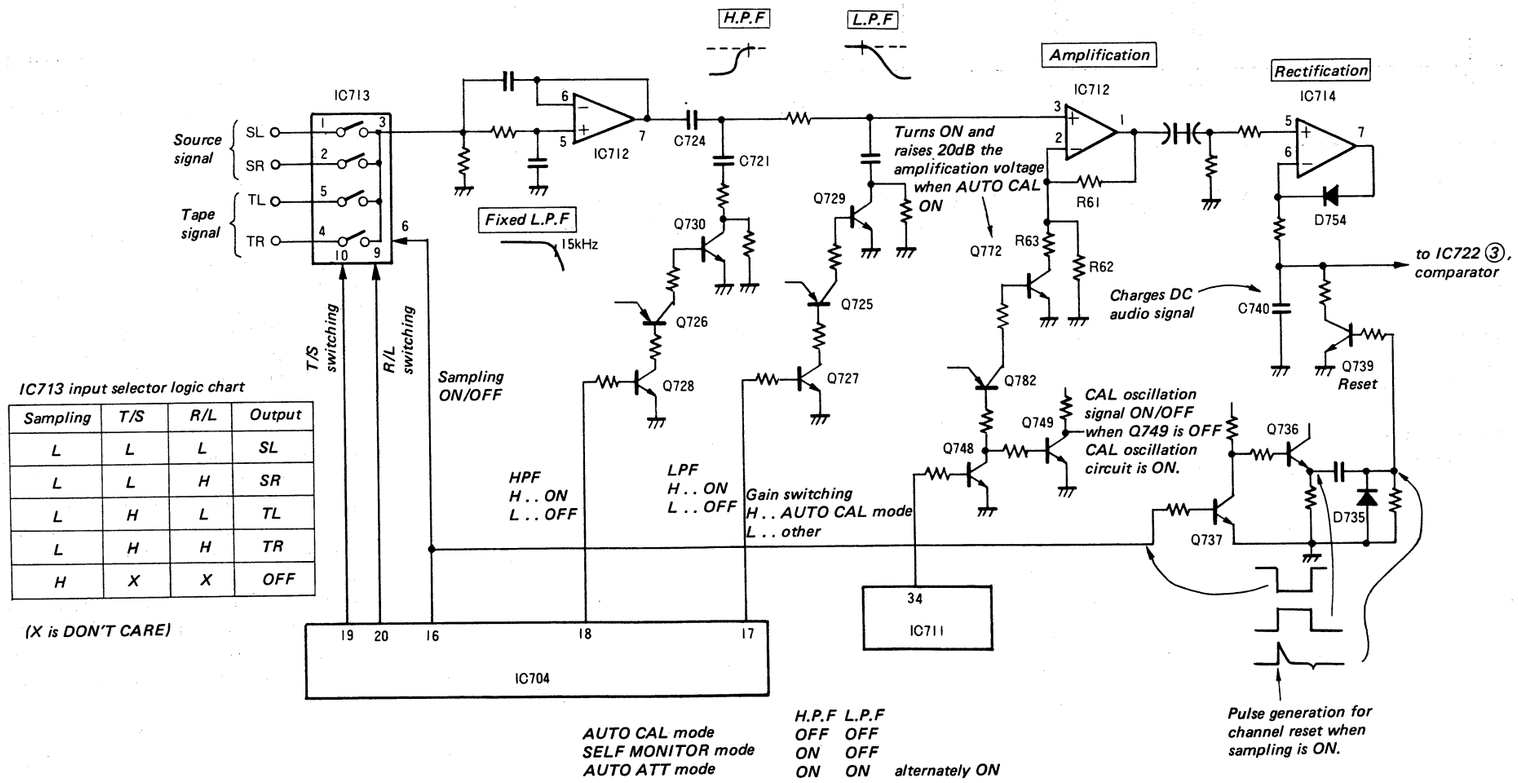
Fig. 13

This circuit selects one of four signals: source signal, tape signal, R-CH or L-CH, and depending on the operation, turns HPF and LPF ON/OFF, rectifies the signal, then charges C740. (Charging voltage varies depending on the size of the signal.)

The DC voltage from the dynamic generator circuit and the voltage charged to C740 are compared, and IC704 leads that output and reads it as a digital value.

For each operation, the levels of the four signal systems are read by the appropriate time division. The respective signal levels are A/D converted, led into IC704 as digital data, and comparison and calculation are performed inside IC704. Therefore, the audio signals themselves are not directly compared.

Audio Signal DC Circuit Diagram



IC713 input selector logic chart

Sampling	T/S	R/L	Output
L	L	L	SL
L	L	H	SR
L	H	L	TL
L	H	H	TR
H	X	X	OFF

(X is DON'T CARE)

	H.P.F	L.P.F
AUTO CAL mode	OFF	OFF
SELF MONITOR mode	ON	OFF
AUTO ATT mode	ON	ON alternately ON

Fig. 14

11. LOG Compressed Comparative Voltage Generation

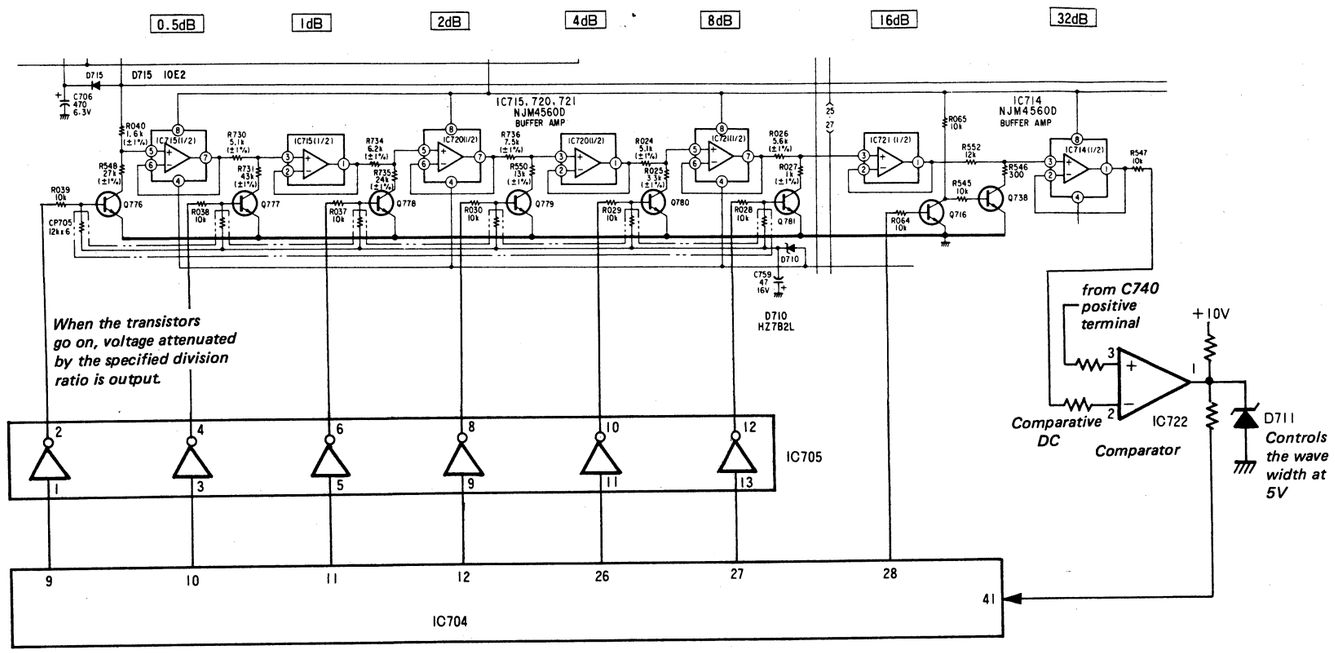


Fig. 15

This circuit generates LOG compressed comparative reference DC voltage.
It divides the stabilized 5V into the specified proportions in 7 stages: 0.5, 1, ... 16, 32dB.
The control for each stage (7 bits) is done by IC704 pins ⑨– ⑫ , ㉖ – ㉘ .
When IC704 output is low, the transistor in each stage goes on, and is attenuated at the proper ratio.

When the transistors go off, 5V is output at IC714 ① . When IC704 output is low the transistors go on.

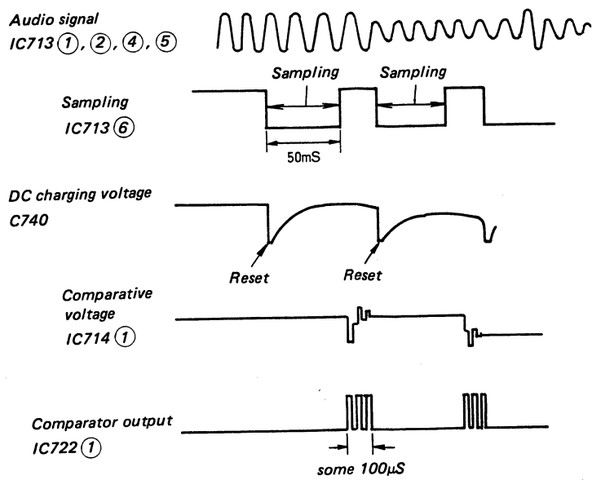
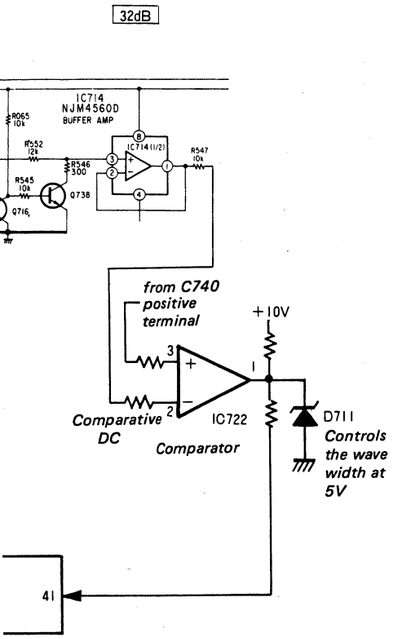


Fig. 16

As in Fig. 16, among the signals applied to IC713 output, the source signal or tape signal L or R is selected by IC704 (micon) and when IC713 pin ⑥ is low, outputs from pin ③ .
The signal from pin ③ passes through the circuits, inputs to IC714 pin ⑤ , and the audio signal is rectified.
This rectified voltage is charged to C740 and is simultaneously applied to IC722 pin ③ .
The voltage of IC722 ③ and ② are compared. The voltage applied to ② results from a combination of from 0.5dB to 32dB resulting from signals output from IC704 ⑨ – ⑫ , ㉖ – ㉘ .
First 31.5dB voltage is applied to ② . (turns on Q738)
The voltages of ② and ③ are compared, and if the result is that voltage on ③ is higher, IC722 ① goes high, and this is applied to IC704 pin ㊶ .
Next, 16dB is applied to the 31.5dB voltage above, and the resulting 47.5dB is applied to pin ② . Then it is compared to voltage at pin ③ and that result is applied to IC704 pin ㊶ .
In this way the successive comparisons are made, ending with 0.5dB, and the microcomputer reads the audio signal level as dB value (digital data). (Serial comparison method, shown in Fig. 17.)



tors go off, 5V is output at IC714
4 output is low the transistors go on.

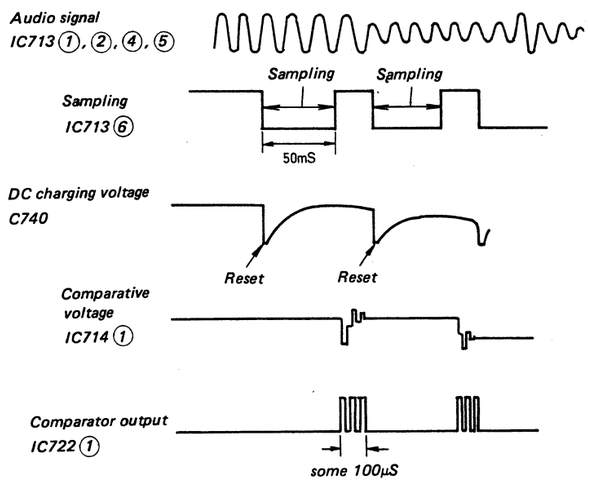


Fig. 16

As in Fig. 16, among the signals applied to IC713 output, the source signal or tape signal L or R is selected by IC704 (micon) and when IC713 pin ⑥ is low, outputs from pin ③ .

The signal from pin ③ passes through the circuits, inputs to IC714 pin ⑤ , and the audio signal is rectified.

This rectified voltage is charged to C740 and is simultaneously applied to IC722 pin ③ .

The voltage of IC722 ③ and ② are compared. The voltage applied to ② results from a combination of from 0.5dB to 32dB resulting from signals output from IC704 ⑨ – ⑫ , ㉖ – ㉘ .

First 31.5dB voltage is applied to ② . (turns on Q738)

The voltages of ② and ③ are compared, and if the result is that voltage on ③ is higher, IC722 ① goes high, and this is applied to IC704 pin ㊶ .

Next, 16dB is applied to the 31.5dB voltage above, and the resulting 47.5dB is applied to pin ② . Then it is compared to voltage at pin ③ and that result is applied to IC704 pin ㊶ .

In this way the successive comparisons are made, ending with 0.5dB, and the microcomputer reads the audio signal level as dB value (digital data). (Serial comparison method, shown in Fig. 17.)

Serial Comparison Method

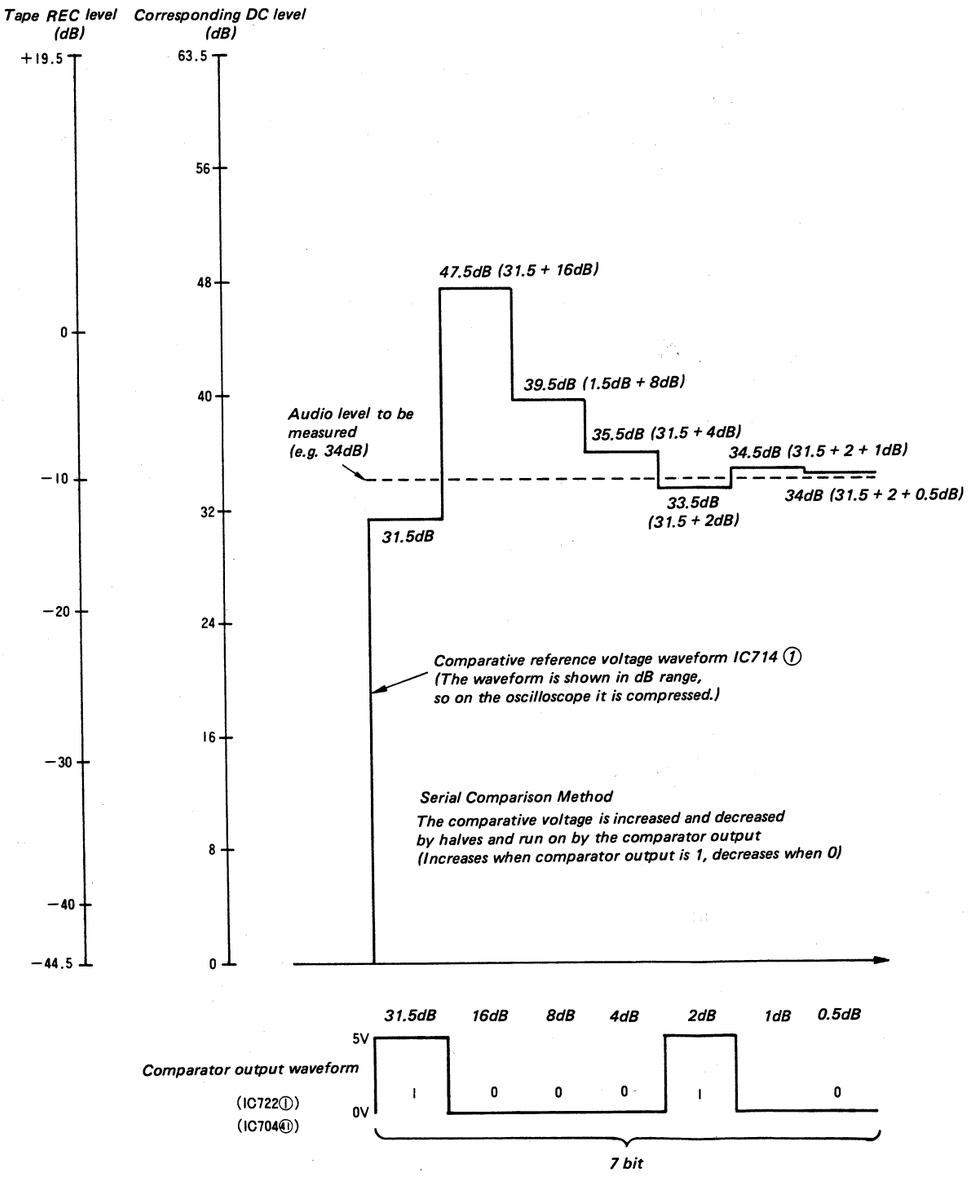


Fig. 17

12. AUTO CAL Operation

AUTO CAL operation can be basically divided as performing the following two adjustments.

1. Recording bias adjustment
2. Recording sensitivity adjustment

When performing these adjustments, the following conditions are automatically established.

REC LEVEL	10dB ATT	These return to the preceding state after AUTO CAL end, but MOL BALANCE remains NORMAL.
REC BALANCE	Center	
DOLBY	OFF	
MPX FILTER	OFF	
MOL BALANCE	NORM	

The operations for the two adjustments are explained in table 4.

	Recording bias adjustment	Recording sensitivity adjustment
Adjustment oscillation frequency	400Hz/8kHz	400Hz
Comparison	Adjusts bias so that the levels of 400Hz and 8kHz are equal when 400Hz and 8kHz are recorded on the tape or played back.	Adjusts so that source level and tape playback level are equal.
Adjustment	Bias control section Data for ASP received at IC706, 708, transistor switching performed, power supply voltage to bias osc. circuit controlled.	REC level (CAL volume inside IC309) 16 positions at 0.4dB steps approx. ±3dB sensitivity adjustment
Adjustment channel	only R-CH	Adj. L/R independently

Table 4

12-1. Recording Bias Adjustment

The adjustment is performed in the following order:

① Records 400Hz.

② Plays back 400Hz, detects level at this time.

③ Records 8kHz.

④ Plays back 8kHz, compares with level in ② (400Hz and 8kHz).

⑤ Controls bias until the 8kHz level is equal to the 400Hz level, and repeats record/playback.

The order of the following explanation corresponds to the steps above.

1. First, regarding the bias value when recording 400Hz, each tape type has its own bias, so recording is done using the bias value of the tape type used.
2. The playback level at this time is detected and memorized. Next, 8kHz is recorded at the same level as in Fig. 18-1. The level at this time and the 400Hz level are compared.
3. At this point the bias is deepened so that the 8kHz and 400Hz levels become equal, or so that the 8kHz level is lower than the 400Hz level. (See Fig. 18-1, Coarse Adjustment)
4. 400Hz is recorded at the bias value established in 3.
   At this time, the playback level is detected and memorized.
5. Next, 8kHz is recorded and the playback level at this time is detected, and compared with 400Hz. If 8kHz level is higher, the bias is deepened, and if it is lower, it is made shallow, to adjust so that 400Hz and 8kHz levels are equal. (See Fig. 18-2, Fine Adjustment)

For coarse adjustment, the bias is gradually deepened, even if the 8kHz level was lower than 400Hz when 400Hz and 8kHz were first recorded on the tape. See Fig. 18-3, 4.

The bias curve is exaggerated for the sake of simplicity.

1st time (Coarse Adjustment)

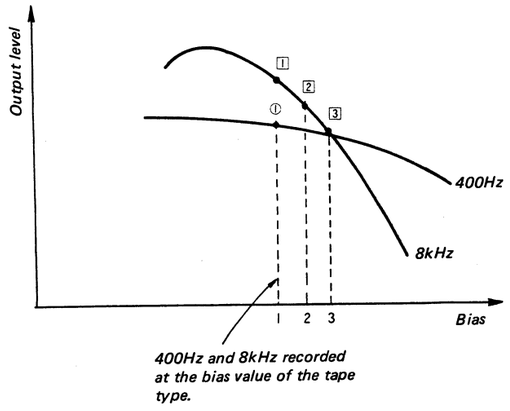


Fig. 18-1

1. Compares ① and [1] → if [1] level is high → deepens bias.
2. Compares ① and [2] → if [2] level is high → deepens bias.
3. Compares ① and [3] → if [3] level is lower, end.

Coarse adjustment is performed by deepening the bias value. (Other possibilities are shown in Fig. 18-3, 4.)

2nd time (Fine Adjustment)

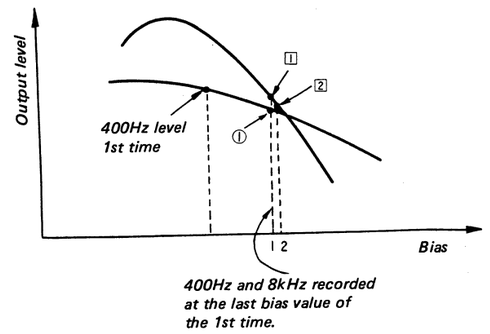


Fig. 18-2

1. Compares ① and [1] → if [1] level is high → deepens bias.
2. Compares ① and [2] → equal → end.

If 8kHz was lower than 400Hz in the first comparison:

1st time (Coarse Adjustment)

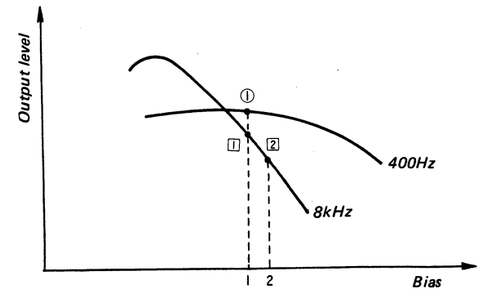


Fig. 18-3

1. Compares ① and [1] → if [1] level is low → deepens bias.
2. Compares ① and [2] → if [2] level is low → end.

2nd time (Fine Adjustment)

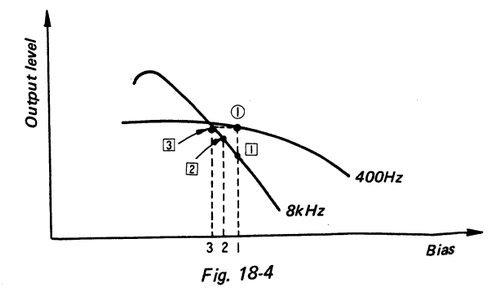


Fig. 18-4

1. Compares ① and [1] → if [1] level is low → makes bias shallow
2. Compares ① and [2] → if [2] level is low → makes bias shallow
3. Compares ① and [3] → equal → end.

12-2. Recording Level Adjustment

During AUTO CAL, the recording level CAL volume is adjusted so that the source and tape playback levels are equal. This is illustrated in Fig. 19.

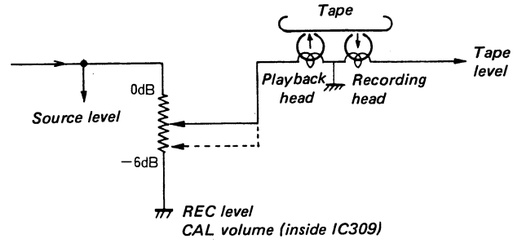


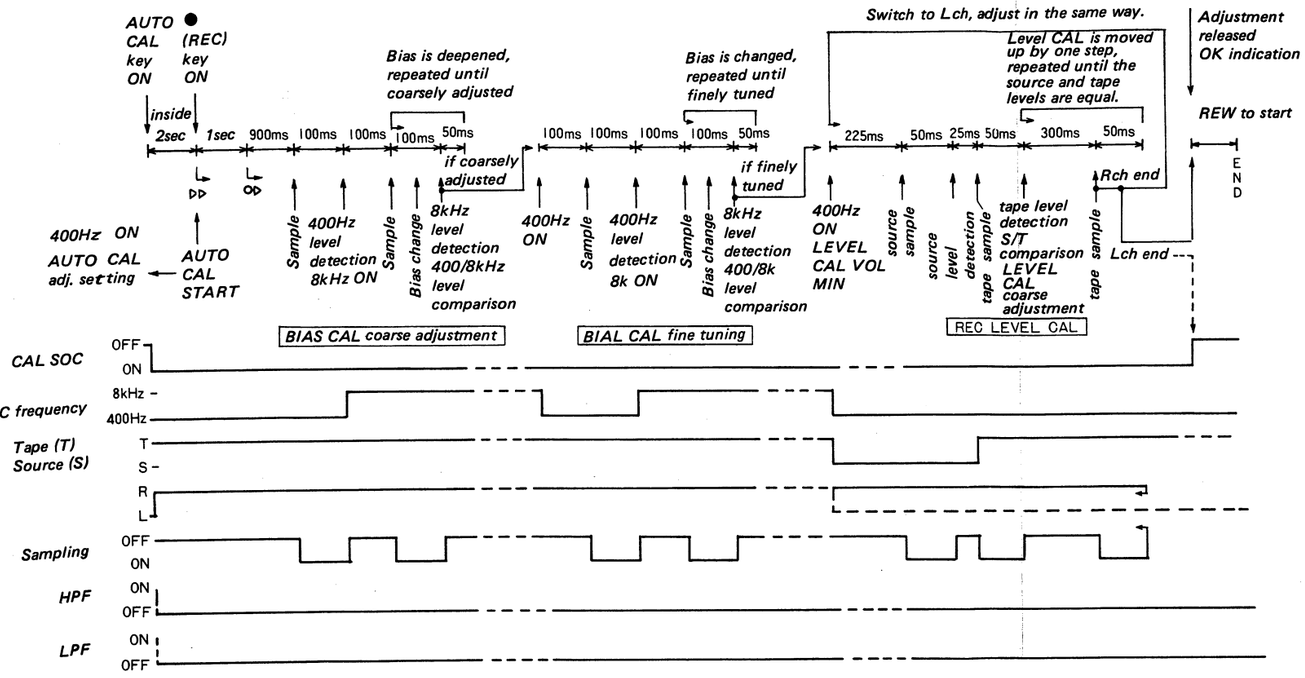
Fig. 19

1. The recording level CAL volume is set to minimum (−6dB) position (dotted line in Fig. 19 and 400Hz is recorded.
   The source and tape levels at this time are compared.
   ① Tape is larger than source.
   ② Source is more than 6dB larger than tape.
   Both of these cases fall outside the adjustment range specifications and are NG.
2. The volume is changed the amount of the level difference in step 1. (Volume is actually a step volume.)
   The level detection for source and tape is in 0.5dB steps, so if the level difference was 3.5dB, the volume should be moved 7 steps.
   Therefore, it is moved 7 steps up (coarse adjustment).
3. However, since the recording level adjustment volume is in 0.4dB steps, the tape level will only go up 2.8dB by stepping up the volume. So, the tape level in step 2 is detected and compared with the source level in step 1. (0.7dB of difference in the example used here.)
   The volume moves up (down if it goes over) one step (0.4dB) at a time so that the source and tape levels are equal. (up to 4 times maximum; fine adjustment).

In this way the tape and source levels are made equal.

After completing the adjustment for R-CH, it is performed for L-CH, and when both channels are adjusted AUTO CAL operation is finished.

Fig. 20 is the timing chart of AUTO CAL operation.



CAL OSC	IC711	34 pin	H/L level for each pin
OSC frequency	IC704	15 pin	
T/S switching	IC704	19 pin	
R/L switching	IC704	20 pin	
Sampling	IC704	16 pin	
HPF	IC704	18 pin	
LPF	IC704	17 pin	

Fig. 20

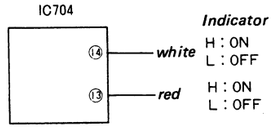
13. AUTO ATT/SELF MONITOR

AUTO ATT operates only in the following modes: (AUTO ATT switch ON)

●, ● II, ●▶ II, ●▶■

SELF MONITOR operates only during recording. (It does not operate when the tape is stopped to compare source level and tape playback level.) When the AUTO ATT switch is on, both operations are performed simultaneously.

SELF MONITOR Indication



	SELF MONITOR	AUTO ATT
Mode	only during ●▶	AUTO ATT switch ON and ● (REC LAMP) lit up
H.P.F. L.P.F.	HPF ..... ON LPF ..... OFF	HPF, LPF ON alternately
Comparison	Detects source level, and after time lag (75mS) caused by head space, detects tape playback level and compares the two levels.	Samples source level high and low range alternately, detects the levels and for each, compares with 8kHz and 400Hz established MOL value.
Operation (Indication)	When the tape level goes more than 3dB down in relation to source level, white indicator blinks; more than 6dB down, white and red indicators blink. (Beep noise for red only.)	Attenuates REC level by the dB by which the source level is larger than the established MOL values. (ATT indicator)

Table 5

Timing Chart

DURING SELF MONITOR *(AUTO ATT is OFF in ●▶ mode)*

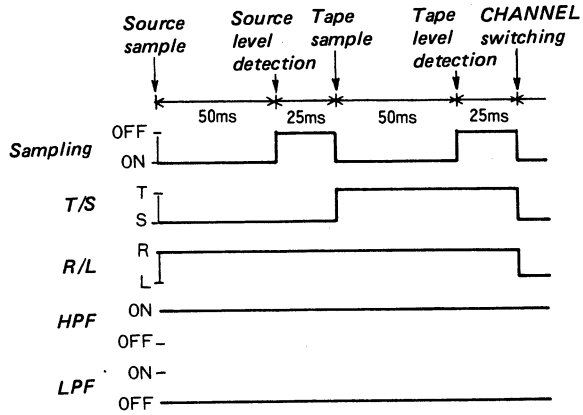
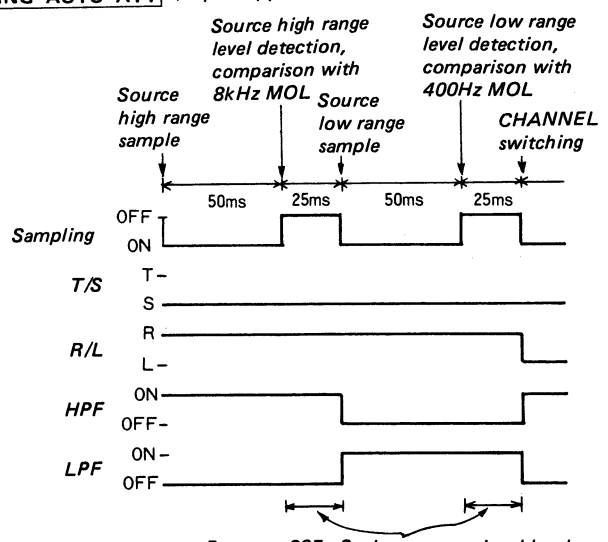


Fig. 21

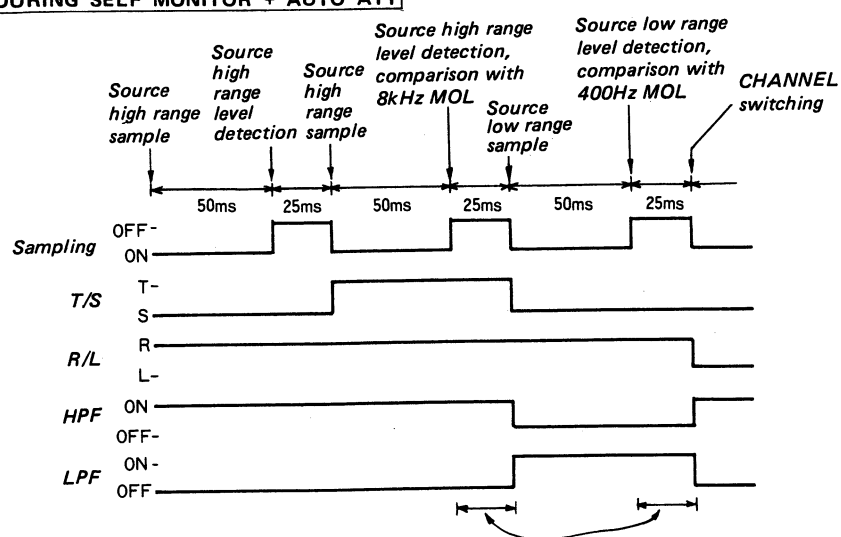
DURING AUTO ATT *(Tape stopped if AUTO ATT ON in ●, ●▶ ❚❚ modes)*



Becomes 225mS when source signal level goes over MOL value and attenuates REC LEVEL.

Fig. 22

DURING SELF MONITOR + AUTO ATT



Becomes 225mS when source signal level goes over MOL value and attenuates REC LEVEL.

Fig. 23

(AUTO ATT ON and ●▶ mode)
- sampling IC704 pin (16)
- T/S IC704 pin (19)
- R/L IC704 pin (20)
- HPF IC704 pin (18)
- LPF IC704 pin (17)
- The timing charts for SELF MONITOR, AUTO ATT and both combined are shown for one channel. It is repeated, R →L →R →L, when the channel is switched.

14. MOL BALANCE

MOL BALANCE changes the MOL response by comparing the bias to the established value for each tape type and raising or lowering it accordingly. When the MOL BALANCE switch is pressed, MOL response changes, regardless of the operation mode.

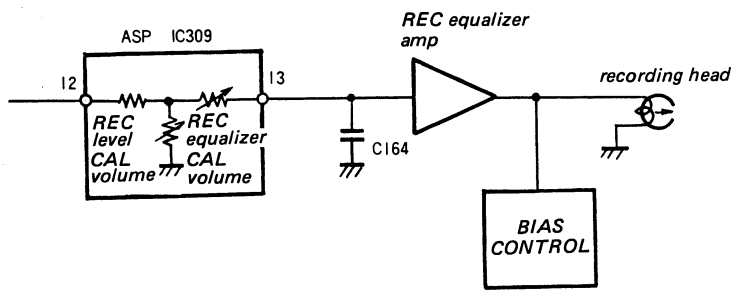


Fig. 24

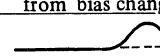
MOL BALANCE	Bias			REC equalizer CAL volume			REC level CAL volume	
	amount	step #	freq. response change resulting from bias change	feed impedance	step #	freq. response change resulting from equalizer change	amount	step
SHARP	shallow	increase		larger			increase	decrease
SOFT	deep	decrease		smaller			increase	decrease

Table 6

Table 6 shows the changes compared to NORMAL state.
The number of steps (step #:) refers to the ASP control data step number. In order to maintain an almost flat frequency response even when raising or lowering the bias, a variable equalizer is linked.

The equalizer is controled by changing the recording equalizer CAL volume, the feed impedance and the LPF cut-off frequency with C164. (See Fig. (2))
When the recording equalizer CAL volume is changed, the levels fluctuate slightly, so the volume is changed by ±0.4dB (±1 step).

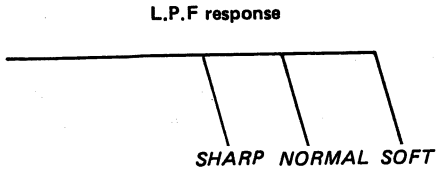


Fig. 25

Fig. 26 is a graph showing the relationship between frequency and output level.
As can be seen, by changing the bias the MOL response is changed. However, since the recording equalizer is linked and changes also, there is almost no frequency response change at low level.

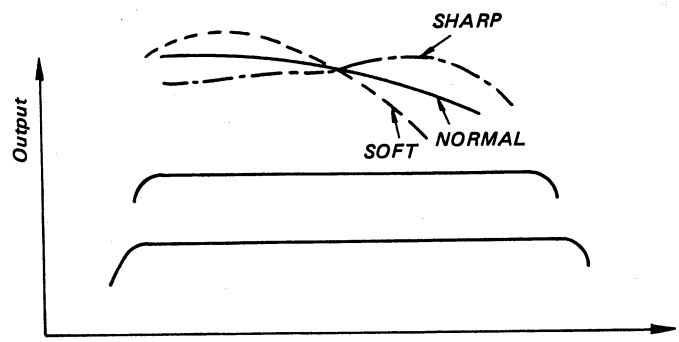


Fig. 26

15. Remote Control Circuit

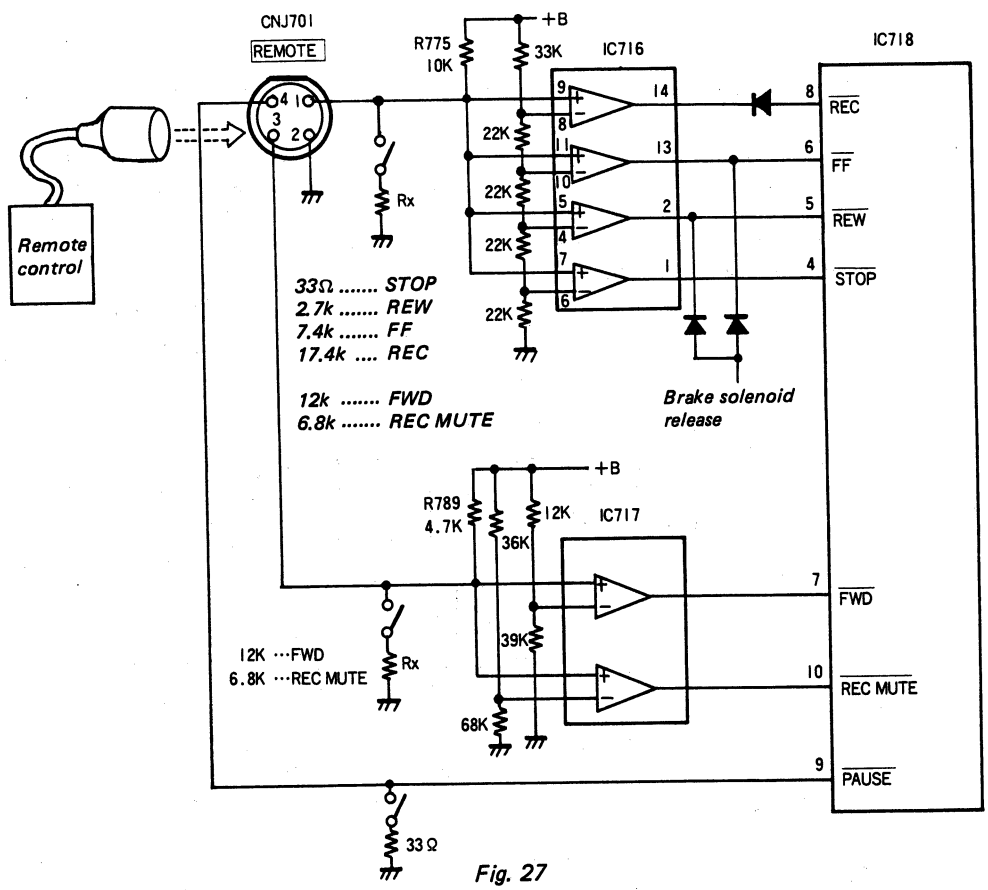


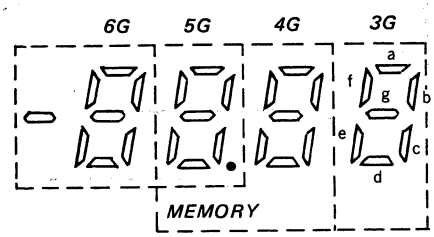
Fig. 27

Resistors are connected inside remote control corresponding to each button.
The mode selects which of IC716, 717 outputs to make low by voltage division comparison by this resistance value (Rx). (Output is normally all high.) During FF and REW, the brake solenoid is released simultaneously.

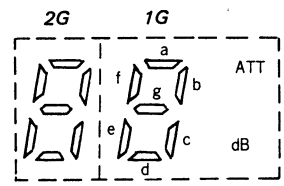
16. Indicator Circuit/Peak Level Meter

16-1. Indicator Circuit

Counter and recording level indicator data are output from IC703 and input to IC1003.
IC1003 drives the fluorescent indicator tube. a – g data is output on ⑪ – ⑰ ; and ⑱ outputs the decimal point and MEMORY data.
The a – g of FL1001 (REC level indicator) and FL1002 (COUNTER indicator) are connected to each other, so indication is performed by turning the grid on by time sharing.
The signal to this grid is from the output signal from IC1001. IC703 (micon) controls all of these signals.
1G – 6G are turned on in order and by sending out a – g data, the decimal point and MEMORY data in conjunction with this, REC level and COUNTER indications are performed.



FL1002



FL1001

Fig. 28

16-2. Peak Level Meter

IC1004 performs REC/PLAY peak level meter indication. The signal which was LOG amplified in the audio section IC306 is applied to IC1004 pins ㉓ , ㉔ . (㉓ : R-CH; ㉔ : L-CH)
This signal is A/D converted, and depending on its size, is converted to a 4 bit signal. This bit signal is converted into 10 decimal and drives the indicator tube.
Also, this IC has a peak hold function, and peak reset is performed by R1063 and C1060 charging circuit.
Peak hold is performed until C1060 is charged to a certain voltage, and then IC1004 transistor turns on when C1060 is charged to that voltage, and reset is performed.
These operations are performed by L, R time sharing. Q1052, Q1054 are turned on and off alternately by the L, R grids drive transistor.

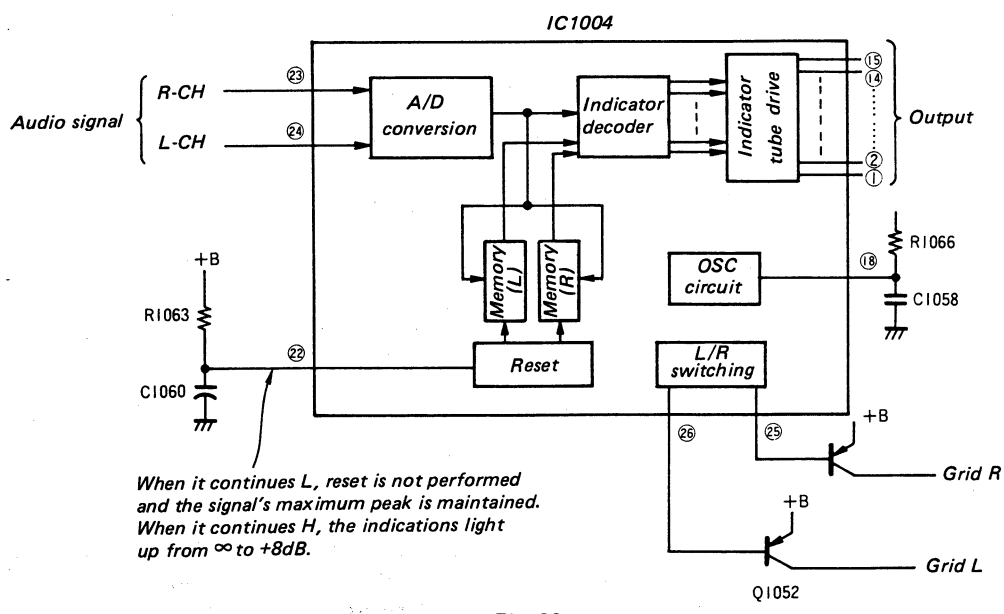


Fig. 29

17. Back-up Battery/Reset Circuit

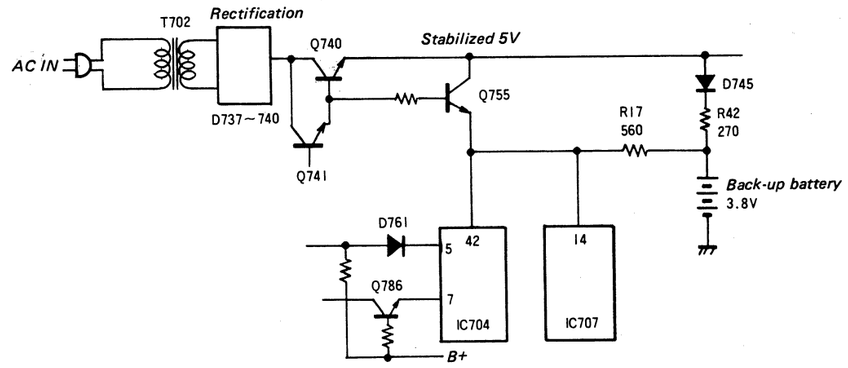


Fig. 30

17-1. Back-up Battery

When AC power supply is applied at the AC plug, Q755 is turned on by Q740 base rise, and switches from back-up battery to stabilized 5V power supply. Simultaneously, the back-up battery is charged via D745, R42.

When the AC power supply is cut off, IC704 goes into low power consumption stand-by mode due to the stand-by signal, and along with IC707, power is supplied from the back-up battery.

The current consumption at this time is less than 100μA, so in case the current value is extremely large, it is necessary to confirm if the stand-by signal and reset timing signal are normal.

D761, Q786 are off during back-up battery use to keep ⑤ , ⑦ ports open. If D761, Q786 are shorted, the back-up battery voltage will drop quickly.

17-2 Reset Circuit

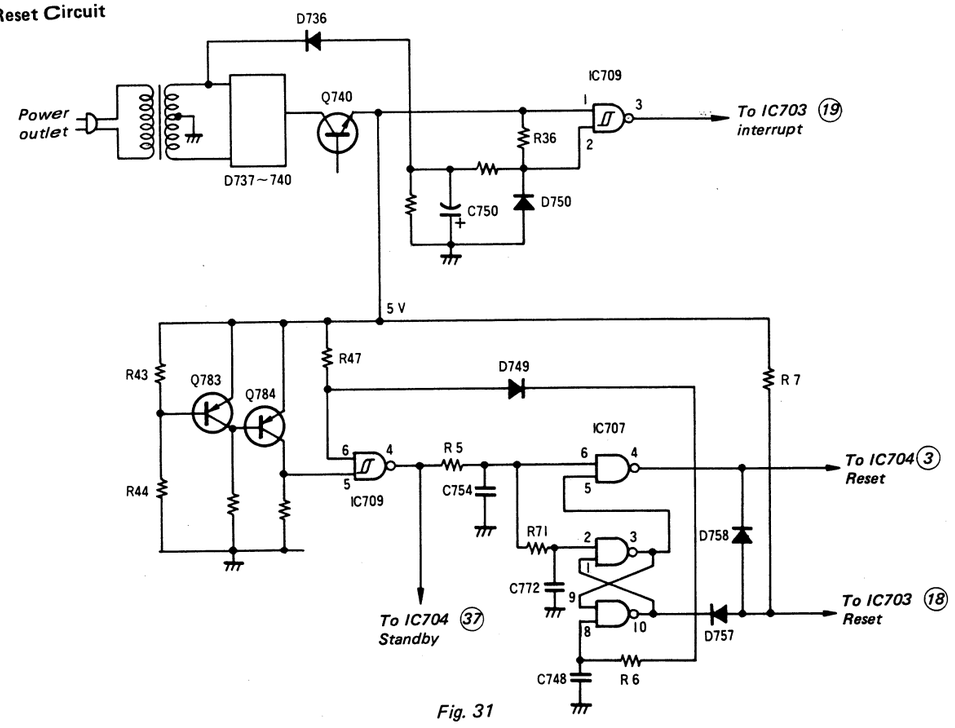


Fig. 31

POWER OFF

When the power plug is disconnected and power supply stops, the potential (negative potential) rectified by D736 rises to the + side by R36.

This is faster than the drop of the 5V line, so IC709 pins ① , ② go high, and pin ③ goes from high to low. This is applied to IC703 pin ⑲ .

When IC703 pin ⑲ goes low, the microcomputer performs interrupt.

Then the 5V line voltage begins to drop, and when the potential at both sides of R43 goes under 0.7V, Q783 goes off and Q784 goes on.

IC704 goes into stand-by with this signal.

IC704, 707 are always backed up by a charging-type battery.

The signal from IC709 ④ is delayed about 10mS in the R5, C754 integrated circuit and applied to IC707 ② .

This signal reverses the IC707 flip, and low pin ③ goes high and high pin ⑩ goes low.

This causes IC703 ⑱ to go from high to low, resetting IC703.

Power is constantly supplied to IC704, 707 from the charging-type battery, so even when AC power is off, IC707 ④ , IC704 ③ maintain high level and the reset signal is not applied.

POWER ON

As the 5V line gradually rises, Q703 goes on and Q784 turns off when the voltage at both sides of R43 goes over 0.7V. (Q784 is on before Q783 turns on.)

This signal is applied to IC709 ⑤ and pin ④ goes from low to high.

This causes IC704 ㊲ to go high, and stand-by mode is released.

The IC709 ④ signal is delayed about 10mS by R5, C754 integrated circuit and applied to IC707 ⑥ .

The status of the pins before this signal is applied is shown below.

IC707

②	L	⑨	H	⑥	L
①	L	⑧	H	⑤	H
③	H	⑩	L	④	H

When IC707 ⑥ goes high, ④ goes low, and IC704 microcomputer is reset.

The signal on ④ is delayed about 10mS by R6, C748 integrated circuit and is applied to IC707 ⑧ .

This causes ⑩ to go high. Therefore, pin ① also goes high. (When ⑩ goes from low to high, IC703 reset is released.)

Since both ① and ② go high, ③ goes low. Therefore, ⑤ also goes low.

This causes ④ to go low, and IC704 reset is released. In this way both IC703 and IC704 are reset.

When AC power is off, IC704 is on stand-by, but when reset is applied (③ goes low momentarily) memory content is disturbed, and it is possible that it will not be accurately maintained.

Timing Chart of Micon Reset

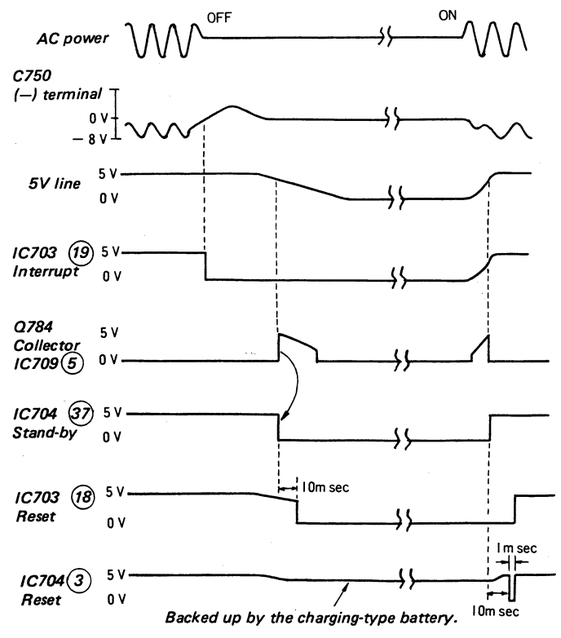


Fig. 32

18. IC718

a) Outline

The MSM5836 (IC718) is a C-MOS digital IC. This IC electrically controls the mechanism of this set. This IC puts out the required output signals in accordance with the switched-in commanding input signals with predetermined processing timings.
This IC consists mainly of the following six blocks.

1. **Input Circuits:**
   The input circuits eliminate chattering of the input signals, determine the priority of input switches and then latch the operational or desired mode.
2. **Control Circuits:**
   The control circuits generate signals to control the timer operation, automatic music-selection (AMS) operation, automatic operation, reset operation, etc.
3. **LED-Drive Circiuits:**
   This circuits put out the drive signals to LED indicate the mode specified by items 1, 2.
4. **Timing Circuits:**
   This circuit makes the switching periods of the output signals in good timings everytime a mode is changed to another one specified by items 1, 2.
5. **Solenoid and Motor-Drive Output Circuits.**
   These circuits put out signals to operate the mechanism of the deck. The circuits connect to the solenoid- and motor-drive circuits.
6. **Muting Signal Output Circuits:**
   These circuits connect to the amplifier circuits for the elimination of noise and selection of audio-signal system.

b) Explanation of Terminals

b-1. Function-Switch Inputs:

b-1-1. Functions

Table 7

TERMINAL No.	NAME	FUNCTION	TERMINAL No.	NAME	FUNCTION
4	$\overline{\text{STOP}}$	Signal input to release a mode designated by other input switches.	9	$\overline{\text{PAUSE}}$	Command-signal input to make the set in stop operation temporarily, i.e., pause, or restart operation during play-back and record mode. This is of a self-set and self-reset type. This terminal is reset when the mode is in fast-forward or rewind and $\overline{\text{STOP}}$ and $\overline{\text{REC MUTE}}$ signals are in "L". In other conditions, this terminal can be reset or set. In auto-space operation, this terminal is command-signal input to release record-muting mode in case $\overline{\text{REC MUTE}}$ is in "H".
5	$\overline{\text{REW}}$	Signal input to command the mechanism to rewind the tape.			
6	$\overline{\text{FF}}$	Signal input to command the mechanism to set in fast-forward mode.			
7	$\overline{\text{FORWARD}}$	Signal input to command the mechanism to play back the tape. This terminal becomes in record-mode command signal when this terminal is put into "L" together with $\overline{\text{REC}}$-signal inputted at the same time. This terminal becomes in the commanding signal to put the set in AMS and auto play, as outlined later, when this terminal becomes in "L" together with $\overline{\text{FF}}$ or $\overline{\text{REW}}$ signal inputted at the same time.	10	$\overline{\text{REC MUTE}}$	Command-signal input to mute record signal and effective only in record and record-pause modes. When this signal is in "L", pause operation is reset. Muting operation is maintained for four seconds after disappearance of this signal (auto-space operation). Auto-space operation is released on receipt of $\overline{\text{PAUSE}}$ input in "L" when this input is in "H".
8	$\overline{\text{REC}}$	Signal input to command the set to become in record-monitor mode. This input is disabled when the set is in fast-forward or rewind and $\overline{\text{STOP}}$ input is in "L".			

Note: $\overline{\text{REW}}$ is $\overline{\text{REWIND}}$
$\overline{\text{FF}}$ is $\overline{\text{FAST FORWARD}}$
$\overline{\text{REC}}$ is $\overline{\text{RECORD}}$

b-1-2. Mode Determination when Two Function Switches are Pressed Duplicately at the Same Time:

Table 8

INPUT "A" \ INPUT "B"	$\overline{\text{STOP}}$	$\overline{\text{REW}}$	$\overline{\text{FF}}$
$\overline{\text{FORWARD}}$ ($\overline{\text{AMS}}$ input is "H")	stop	auto forward	fast forward
$\overline{\text{FORWARD}}$ ($\overline{\text{AMS}}$ input is "L")	stop	AMS (rewind)	AMS (fast forward)
$\overline{\text{FF}}$	stop	rewind	N/A
$\overline{\text{REW}}$	stop	N/A	N/A

Notes: 1. When one of the two switches is released the mode is designated by the function switch still kept pressed (last in, last served).
2. When $\overline{\text{REW}}$ and $\overline{\text{FF}}$ switches are pressed simultaneously during AMS operation, the mode also becomes in rewind.

b-1-3. Mode Change by Input Function Switch

Table 9 FF is fast forward.

INPUT SWITCH \ PRESENT MODE	$\overline{\text{STOP}}$	$\overline{\text{REW}}$	$\overline{\text{FF}}$	$\overline{\text{FORWARD}}$	$\overline{\text{REC}}$	$\overline{\text{PAUSE}}$	$\overline{\text{REC}}$ $\overline{\text{FORWARD}}$	$\overline{\text{REW}}$ $\overline{\text{FORWARD}}$	$\overline{\text{FF}}$ $\overline{\text{FORWARD}}$
stop	stop	rewind	FF	playback	REC	pause	record	*2	*3
rewind	stop	rewind	FF	playback	rewind	rewind	record	*2	*3
fast forward	stop	rewind	FF	playback	fast forward	fast forward	record	*2	*3
playback	stop	rewind	FF	playback	playback	playback/ pause	record	*2	*3
REC *1	stop	rewind	FF	playback	REC	REC/ pause	record	*2	*3
pause	stop	rewind	FF	playback/ pause	REC/ pause	stop	record/ pause	*2	*3
record	stop	rewind	FF	record	record	record/ pause	record	*2	*3
playback/ pause	stop	rewind	FF	playback/ pause	playback/ pause	playback	record/ pause	*2	*3
REC/ pause	stop	rewind	FF	playback/ pause	REC/ pause	REC	record/ pause	*2	*3
record/ pause	stop	rewind	FF	record/ pause	record/ pause	record	record/ pause	*2	*3
auto play	stop	auto play	FF	auto play	auto play	auto play	auto play	auto play	fast forward
AMS (rewind)	stop	AMS (rewind)	AMS (FF)	AMS (rewind)	AMS (rewind)	AMS (rewind)	AMS (rewind)	AMS (rewind)	AMS (FF)
AMS (FF)	stop	AMS (rewind)	AMS (FF)	AMS (FF)	AMS (FF)	AMS (FF)	AMS (FF)	AMS (rewind)	AMS (FF)

Notes: *1. "REC" designates the mode that only the REC switch is pressed from stop mode, and the set becomes in record monitoring mode.
*2. These become in AMS (REW) mode with $\overline{\text{AMS}}$ (input) in "L" and in auto play mode in "H".
*3. These become in fast-forward mode with $\overline{\text{AMS}}$ (input) in "H" or in AMS (FF) with $\overline{\text{AMS}}$ (input) in "L" in the same way as the mode determination shown in b-1-2 above.

b-2. Control Inputs:

b-2-1. Function of Control Inputs

Table 10

TERMINAL No.	NAME	FUNCTION
11	$\overline{\text{SHUT OFF}}$	Input of tape-travel detection. Pulse signal is put into this terminal during forward, fast forward, rewind and record modes. In forward and record modes, the mechanism shuts off and becomes in stop mode in two seconds after the stoppage of tape travel, i.e., stop of pulse. In fast-forward and rewind modes, the mechanism shuts off and becomes in stop mode one second after the stoppage of tape travel likewise.
12	$\overline{\text{COUNTER}}$	Commanding-signal input to stop the mechanism or to put the set into forward mode during rewind mode. Forward mode is made when $\overline{\text{REW}}$ and $\overline{\text{FORWARD}}$ switches are pressed at the same time. In other modes than rewind, this signal is not accepted. Also this signal is not accepted even in rewind mode when $\overline{\text{REW}}$ switch is kept pressed.
15	AMS signal	Input of music-detection signal. This signal is in "H" during a music, and in "L" during a blank inbetween musics. This signal is accepted only in AMS-mode operation.
16	$\overline{\text{AMS}}$	Signal input to put the set into AMS operation. AMS mode is made when this signal is in "L"
18	$\overline{\text{RESET}}$	Signal input to put all of the operation of the set into the initial state.

b-3. Output Signals

Table 11

TERMINAL No.	NAME	FUNCTION
1	RECORD LAMP	Puts out "H" signal in record-monitor, record, record-pause, and record-muting modes.
2	FORWARD LAMP	Puts out "H" signal in forward, forward pause, record, record-pause, auto play, and AMS modes.
3	PAUSE LAMP	Puts out "H" signal in pause mode. Puts out "H" and "L" signals alternately during record muting (for four seconds at the start, 4 Hz after 2 Hz) and during reset mode (for four seconds – 1 Hz).
17	$\overline{\text{TIMER}}$	Puts out "L" signal for only 0.5 second after four-second resetting.
19	RECORD MUTING	Puts out "H" signal only in record and record-muting modes.
20	BIAS	Puts out "H" signal in record and record-muting modes.
21	LINE MUTING	Puts out "H" signal in forward, record, record-monitor, record-pause and record-muting modes. Line muting is off with this signal in "H".
22	R.P.P.	Puts out pulse of 31.25 msec when mode is changed from forward (record and replay inclusive) to forward-pause (record and replay inclusive.)
23	HEAD SOLENOID	Puts out "H" signal for 0.25 second after AMS solenoid energized in forward, record, record-muting and AMS modes.
24	$\overline{\text{AMS}}$ SOLENOID	Puts out "H" signal for 0.25 second after forward motor started turning and in forward and AMS modes.
25	FORWARD MOTOR	Puts out "H" signal in forward, record and record-muting modes.
26	FAST-FORWARD MOTOR	Puts out "H" signal in fast-forward and AMS (fast forward) modes.
27	REWIND MOTOR	Puts out "H" signal in rewind, auto play, AMS (rewind) and AMS (fast forward) modes.

Notes: 1. AMS (fast forward) designates the mode in which the forward and fast-forward switches are pressed simultaneously with AMS input signal in "L".

2. AMS (rewind) designates the mode in which the forward and rewind switches are pressed simultaneously with AMS signal in "L".

c) **Description of Operation**

In the table 12, timings are shown by symbols.

Table 12

SYMBOL	DURATION
a	4 seconds (128t)
b	2 seconds (64t)
c	1 second (32t)
d	0.75 second (24t)
e	0.5 second (16t)
f	0.375 second (12t)
g	0.25 second (8t)
h	0.125 second (4t)
i	62.5 milliseconds (2t)
j	31.25 milliseconds (1t)

$$t = \frac{4}{f_{osc}} \text{ second}$$

f_{osc} = 128Hz (i.e., t = 31.25 milliseconds)

Refer to b-1-3 for the mode-changing operation. These outputs not shown are the same as that in stop mode.

Switch input and output signals are sampled by synchronizing with the clock signal, and a delay time α exists between the input and output signals as shown below.

$$\alpha \text{ min.} = \frac{t}{2}$$

$$\alpha \text{ max.} = \frac{t}{2} + t + \beta$$

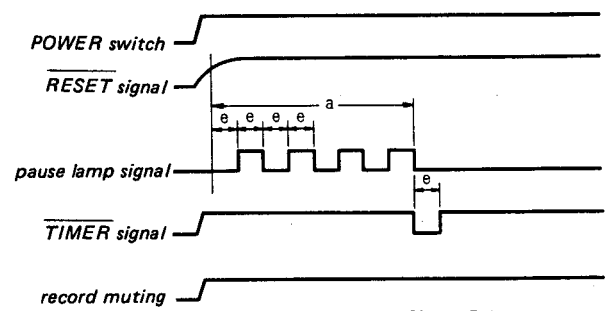
β: chattering duration of switched-in input signal

c-1. When the POWER is Turned ON:

Refer to Fig. 33.

For four seconds after the POWER switch is turned ON (i.e., after $\overline{\text{RESET}}$ input signal became in "H"), the pause lamp repeats going on and off in one-second repetition rate. The reset signal is effective during this four second period and the function-switch inputs are rejected, i.e., the set is in the stop mode.

The $\overline{\text{TIMER}}$ output signal becomes in "L" state for 0.5 second just after the four seconds mentioned above, and this signal stays in "H" state thereafter until the POWER switch is turned off. During the four seconds mentioned above, REC MUTE output signal is in "H" state, and other output signals except for the pause-lamp and $\overline{\text{TIMER}}$ signals are in "L" states.



Note: Other outputs are all "L"
a : 4S
e : 0.5S

Fig. 33

c-2. Stop Mode:

The stop mode is made whenever the $\overline{\text{STOP}}$ switch is pressed regardless of the mode. In stop mode, $\overline{\text{TIMER}}$ and $\overline{\text{REC MUTING}}$ signals are in "H" states and all other signals are in "L" states as shown below.

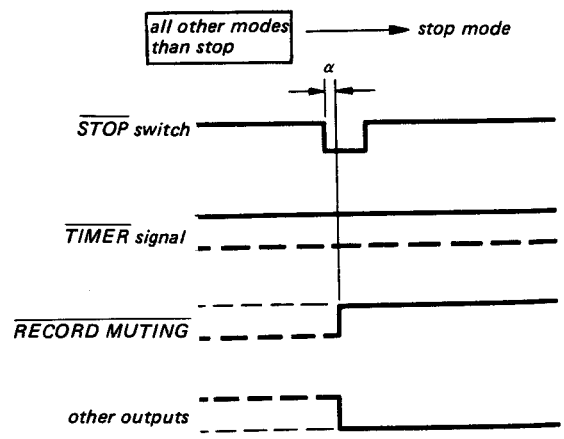


Fig. 34

c-3. Output Disabling:
$\overline{\text{STOP}}$, $\overline{\text{TIMER}}$ and $\overline{\text{RECORD MUTING}}$ outputs are prohibited and become in "L" state for 0.25 second from trailing edges of the rewind motor, fast-forward motor and forward-motor signals.

c-4. Shut-Off Mode:
When the rewind-motor or fast-forward motor or forward-motor signal becomes in "H" state, the shut-off operation starts 0.5 second later the leading edge of the motor signal. This condition stays as long as the motor signal is in "H". When the tape stops traveling and the shut-off signal disappears, the mode changes to stop mode one second later when the rewind-motor or fast-forward-motor signal is in "H", or two second later when the forward-motor signal is in "H". In the auto-play operation, the mode changes from rewind to forward. This will be described later in the auto-play paragraphs.

The usable input-frequency range for the shut-off signal is;

in forward mode: $f_{s\cdot off} < 64$ Hz

in fast-forward and rewind modes: $f_{s\cdot off} < 256$ Hz

where, $f_{s\cdot off}$ = shut-off signal frequency

$f_{osc} = 128$ Hz

c-5. Rewind and Fast-Forward Modes:
Refer to Figs. 35-1, 2.
The rewind mode is made, whenever the $\overline{\text{REW}}$ switch is pressed, from any present mode except for the AMS and auto-play operations.
Likewise, the fast-forward mode is made whenever the $\overline{\text{FF}}$ switch is pressed from any present mode except for the AMS mode.

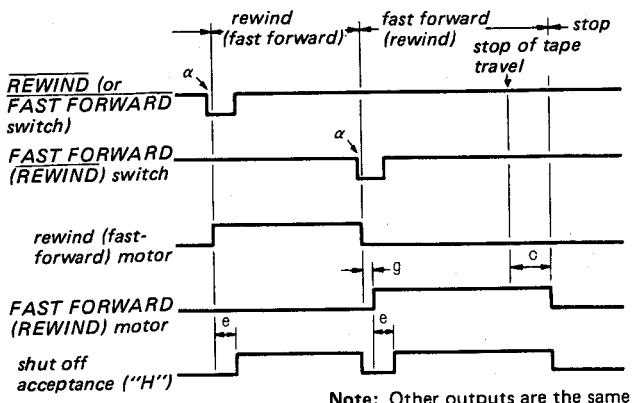


Fig. 35-1 **Note:** Other outputs are the same as in stop mode

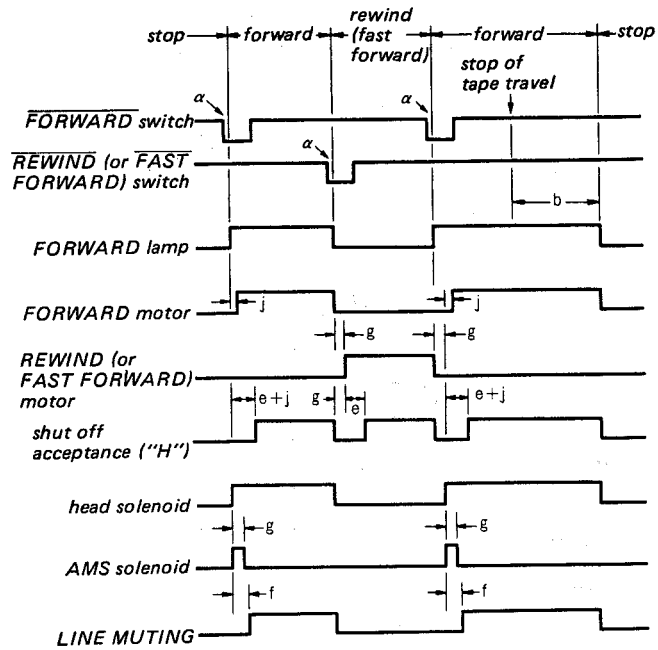


Fig. 35-2 **Note:** b : 2S f : 0.375S
c : 1S g : 0.25S
e : 0.5S j : 31.25mS

c-6. Memory-Stop Mode (auto operation):
During the tape rewinding, the stop mode is made immediately after the $\overline{\text{COUNTER}}$ input becomes in "L" state except for the auto-play mode. This mode, however, is not made when the $\overline{\text{REW}}$ switch has been kept pressed.

c-7. Memory-Forward Mode (auto operation):
When the REW and FORWARD switches are pressed simultaneously, the forward-lamp output becomes in "H" state and the set becomes in the rewind mode. When the counter input changes from "H" to "L" during the above operation, the mode changes to the forward mode. This operation, however, is not made when the REW switch is pressed.

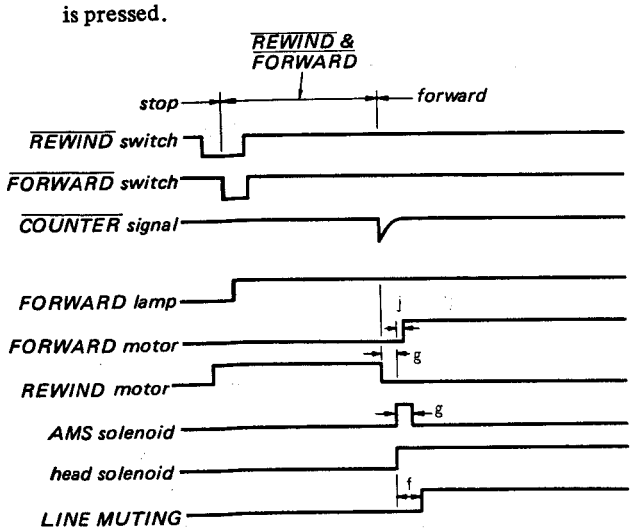


Fig. 36 Note: f : 0.375S J : 31.25mS
g : 0.25S

c-8. Auto-Forward Mode (auto operation):
When the tape comes to the tape beginning and stops traveling during the operation mentioned in c-7 with both the REW and FORWARD switches are pressed simultaneously, the set becomes in the forward mode immediately after the shut-off operation.

c-9. Rewind-AMS Mode:
When the AMS input signal is in "L", the rewind-AMS mode is made with the REW and FORWARD switches are pressed simultaneously. At the instance of the AMS-rewind operation, the forward-lamp output becomes in "H" and the set is put into the rewind mode.
At this moment, the rewind-AMS mode completes at the trailing edge of the AMS-signal input (from "H" to "L") and the mode changes into forward.
When the counter-input signal falls from "H" to "L" in the AMS operation, the mode becomes in memory forward as outlined in c-7. And when the tape stops traveling at the tape beginning, the mode becomes in auto forward as outlined in c-8.
When the FAST FORWARD switch is pressed during the rewind-AMS mode, the mode changes into the Fast-Forward AMS as shown in b-1-3.

c-10. Fast-Forward AMS Mode:
When the AMS signal is in "L", the fast-forward AMS mode is made with the FAST FORWARD and FORWARD switches are pressed simultaneously. The fast-forward AMS mode completes 0.5 second right after the trailing edge of the AMS-signal input (from "H" to "L") and the mode changes into the Rewind-AMS. Thereafter, the operation is the same as the rewind-AMS mode outlined in c-9 above.

When the REWIND switch is pressed during the fast-forward AMS mode, the mode changes into the Rewind AMS as shown in **b-1-3.**

*When the REWIND (or FAST FORWARD) switch is pressed prior to the FORWARD switch:

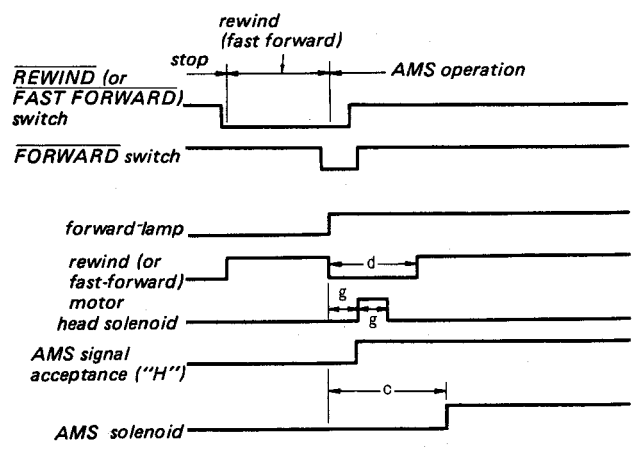


Fig. 37

*When the FORWARD switch is pressed prior to the REWIND (or FAST FORWARD) switch:

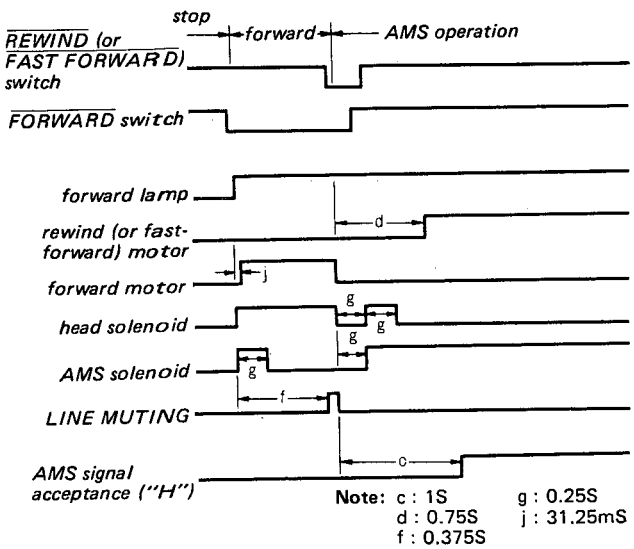


Fig. 38

*Fast-Forward AMS Mode:

- AMS (fast forward) mode:

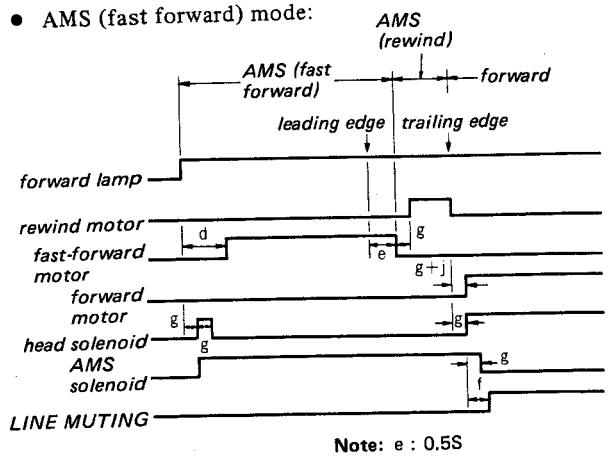


Fig. 39

c-11. Auto-Space Mode:

In the record and record-pause modes, a not-recorded portion is made in the tape when the RECORD MUTING switch is pressed (record-muting signal becomes in "L").

Immediately after the record-muting mode started, the pause-lamp output goes on and off (i.e., pause-lamp output signal goes "H" and "L" alternately) for four seconds in a 0.5 second repetition rate. And when the RECORD MUTING switch is turned off, i.e., released or the record-muting signal is in "H", the mode becomes in the record pause, and the auto-space operation completes.

When the RECORD MUTING switch has been kept pressed for more than four seconds, the on-off repetition rate of the pause-lamp output signal now becomes in 0.25 second after the first four seconds to make a continuous non-recorded portion in the tape. And when the RECORD MUTING switch is released under this condition, the mode also becomes in the record pause, and the auto-space operation completes.

When the PAUSE switch is pressed within the first four seconds, the mode becomes in the record mode and the auto-space operation completes. When the RECORD MUTING switch has been kept pressed in this condition, however, the auto-space mode continues.

In the auto-space mode, the line-muting output signal is in "H" state and the record-monitoring is made possible.

- From Record or Record Pause Mode to Auto-Space Mode:

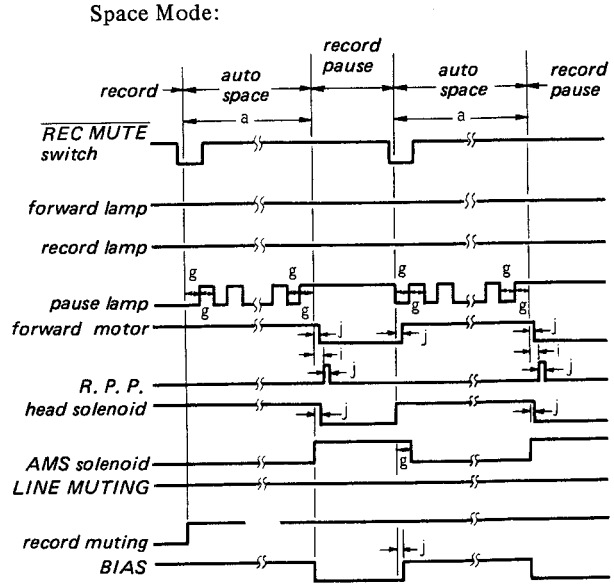
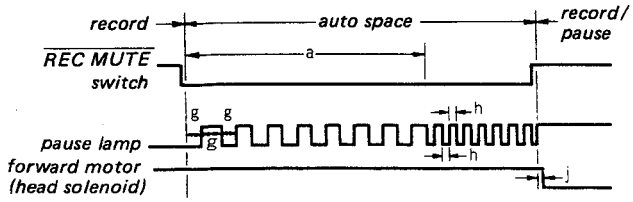


Fig. 40

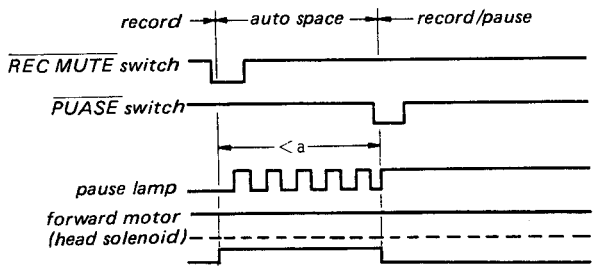
- When REC MUTE Switch is Kept Pressed for more than 4 Seconds:



Note: Other outputs are the same as prior chart.
a : 4S i : 62.5mS
g : 0.25S j : 31.25mS
h : 0.125S

Fig. 41

- When PAUSE Switch is Pressed Within the 4 Seconds of Auto Spacing:



Note: Other outputs are the same as prior chart.

Fig. 42

C-12. **Other Timings**

a) Mode Change from Stop

a-1) From Stop to Pause Mode:

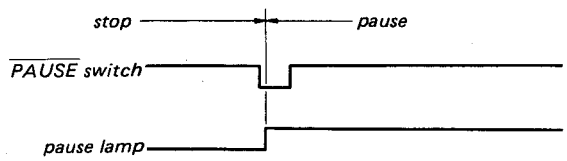
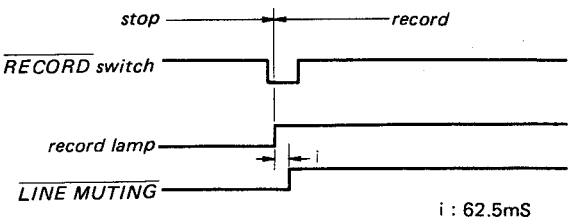


Fig. 43

a-2) From Stop to Record or Record-Monitor Mode:



i : 62.5mS

Fig. 44

a-3) From Stop to Record:

a-3-1. When RECORD Switch is Pressed Within 0.25 Second after FORWARD Switch is Pressed:

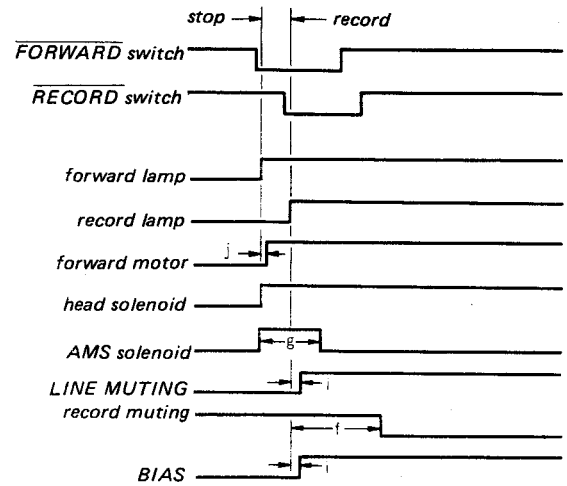
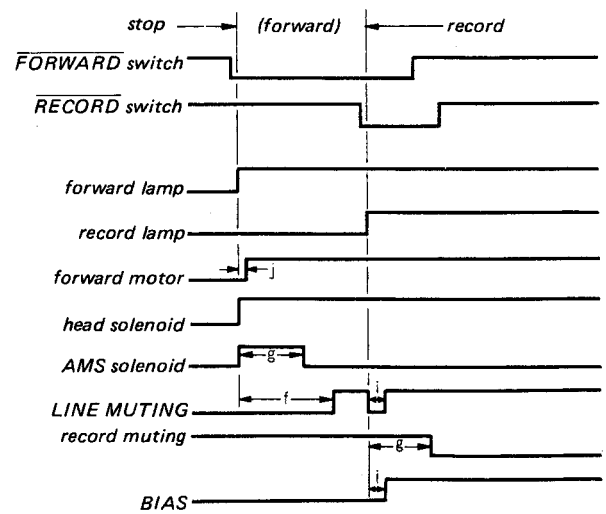


Fig. 45

a-3-2. When RECORD Switch is Pressed more than 0.25 Second Later FORWARD Switch is Pressed:



Note: I : 0.375S i : 62.5mS
g : 0.25S j : 31.25mS

Fig. 46

b) Mode Change From Rewind or Fast Forward to Record:

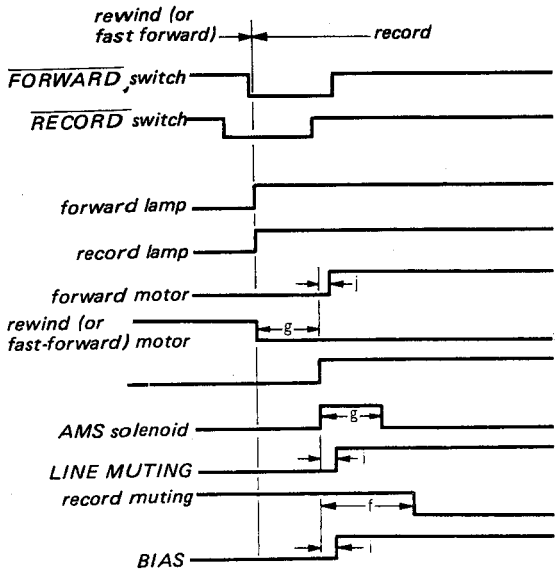


Fig. 47

c) Mode Changes from Forward

c-1. From Forward to Forward-Pause Mode:

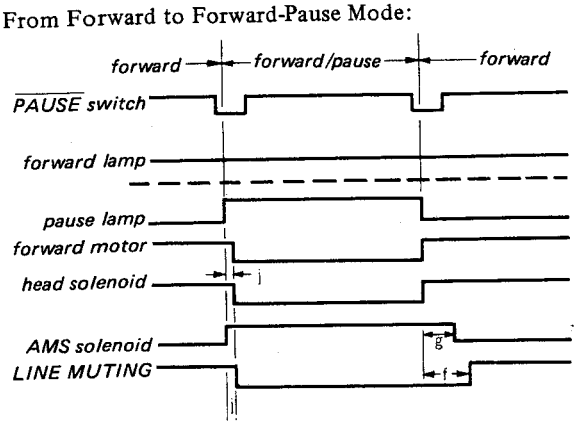
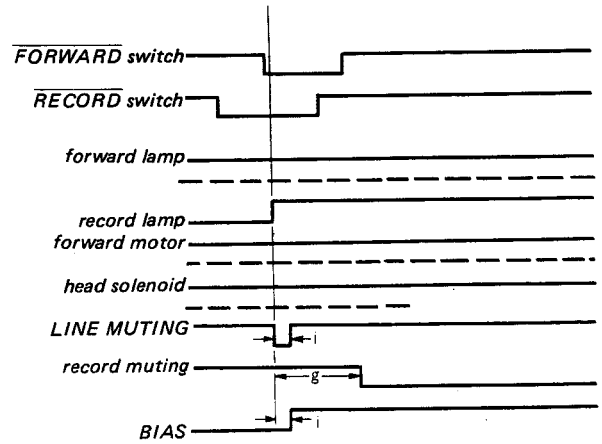


Fig. 48

c-2. Forward ↔ Record



Note: f : 0.375S i : 62.5mS
g : 0.25S j : 31.25mS

Fig. 49

d) Mode Changes from Pause

d-1. From Pause to Forward Pause

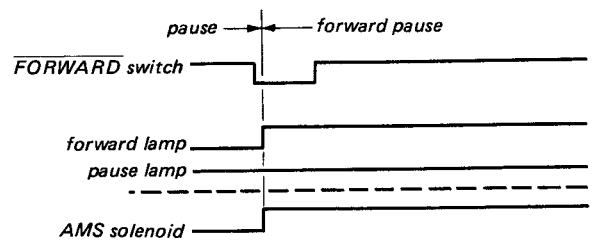


Fig. 50

d-2. From Pause to Record Pause

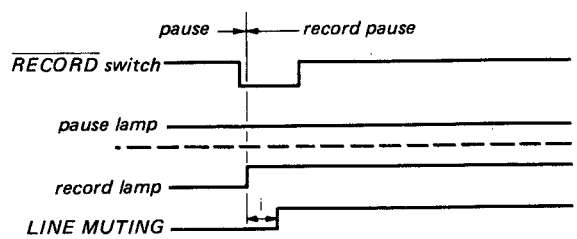


Fig. 51

d-3. From Pause to Record Pause

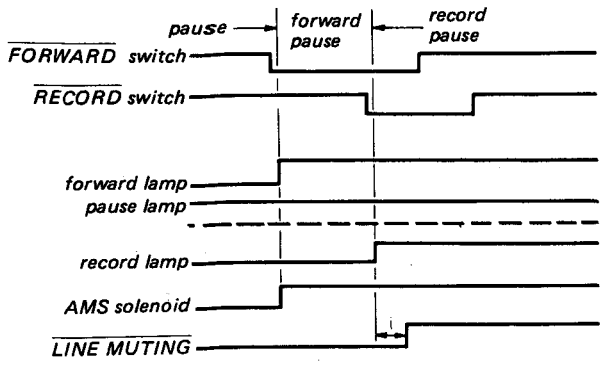


Fig. 52

e) Mode Changes from Record

e-1. From Record to Forward

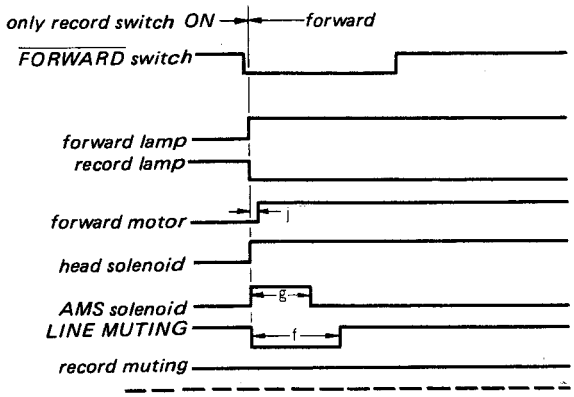
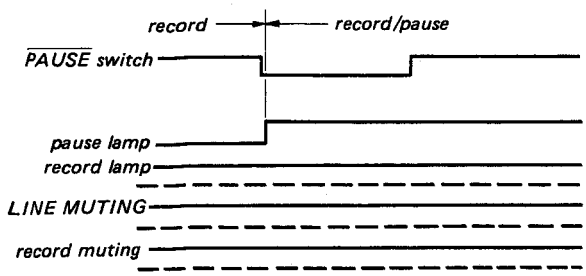


Fig. 53

e-2. Only Record Button Pressed
→ Record and Pause Buttons Pressed



Note: f : 0.375S g : 0.25S j : 31.25mS

Fig. 54

e-3. Only Record Button Pressed → Record Mode

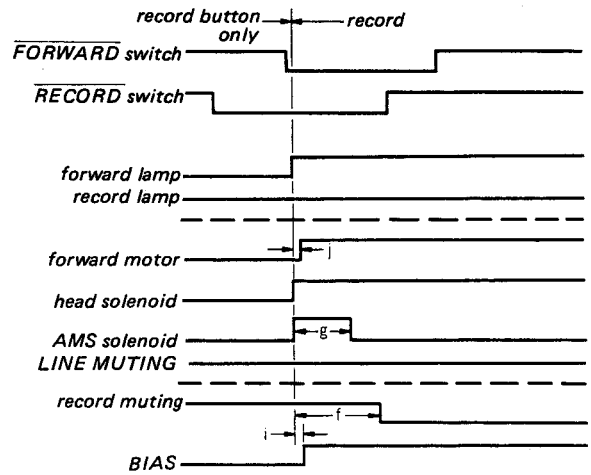


Fig. 55

f) From Forward Pause Mode to Record Pause Mode

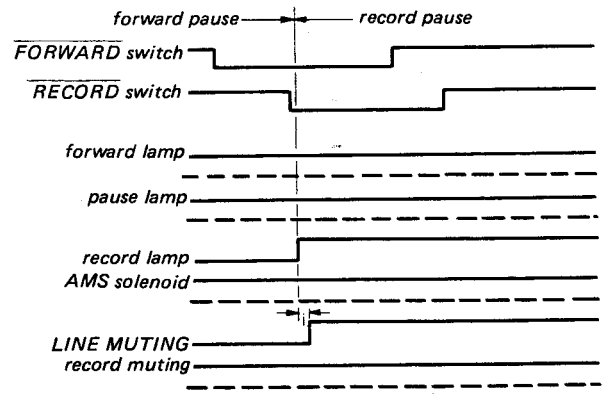
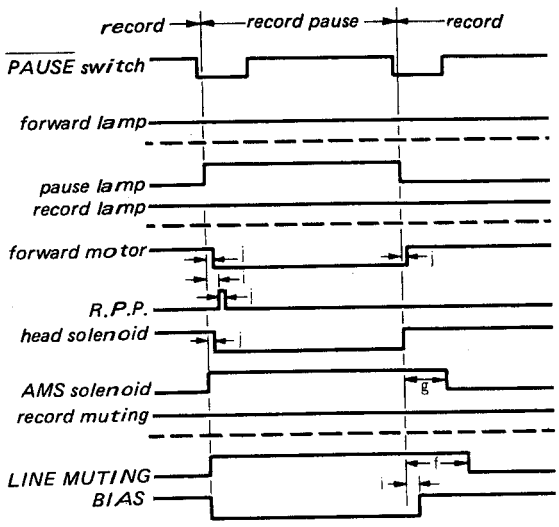


Fig. 56

g) From Record to Record Pause



Note: f : 0.375S i : 62.5mS
g : 0.25S j : 31.25mS

Fig. 57

h) From Record Pause Buttons ON to Other Modes

h-1. To Forward Pause

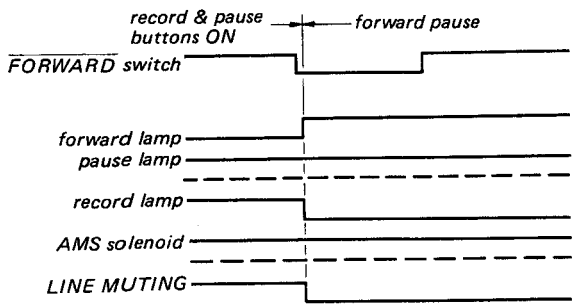


Fig. 58

h-2. To Record Pause

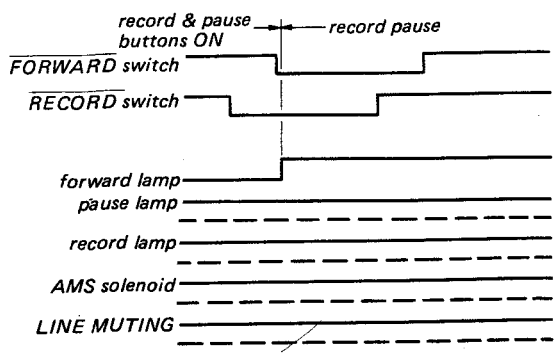
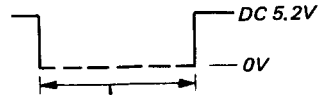
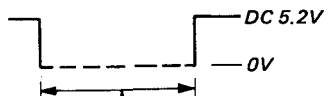
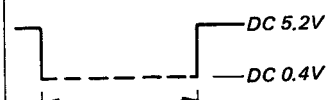
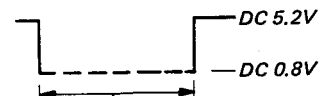
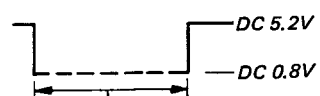
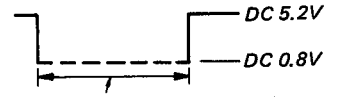
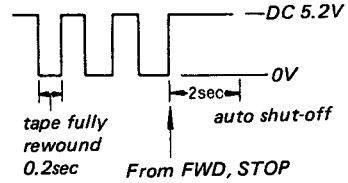
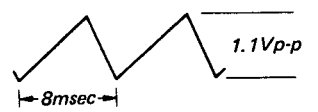
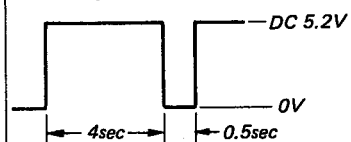
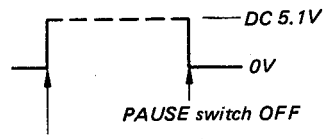


Fig. 59

IC718 terminals, terminal waveforms and operation voltage values

Pin No.	Waveform or Voltage
①	● lamp drive REC: DC 4.5V STOP: DC 0V
②	▶ lamp drive REC and PB: DC 4.5V STOP: DC 0V
③	❚❚ lamp drive PAUSE: DC 4.6V STOP: DC 0V
④	■ switch input (STOP)  while STOP button is pressed continuously STOP: DC 0V
⑤	◀◀ switch input (REW)  while REW button is pressed continuously STOP: DC 4V
⑥	▶▶ switch input (FF)  while FF button is pressed continuously STOP: DC 0V
⑦	▶ switch input (FWD)  while FWD button is pressed continuously
⑧	● switch input (REC)  while REC button is pressed continuously STOP: DC 4.6V
⑨	❚❚ switch input (PAUSE)  while PAUSE button is pressed continuously STOP: DC 5.2V

Pin No.	Waveform or Voltage
⑩	◉ switch input (REC MUTE)  while REC MUTE button is pressed continuously STOP: DC 5.2V
⑪	Auto Shut-off Signal  tape fully rewound 0.2sec From FWD, STOP at tape end auto shut-off (Depending on T reel table angle, may become 0V after shut-off.
⑫	Tape counter "999" input (Counter) DC 4.8V
⑬	Clock signal DC 1.6V 
⑭	GND
⑮	AMS Signal DC 4.7V
⑯	AMS mode signal (AMS) DC 3.5V
⑰	Timer Signal (TIMER)  POWER switch ON (no relation to TIMER switch position)
⑱	Reset Signal (RESET) DC 4V
⑲	REC Muting Signal  PAUSE switch OFF REC MUTE switch ON from REC mode

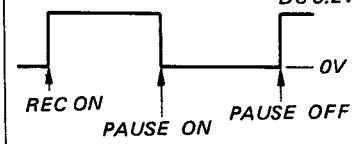
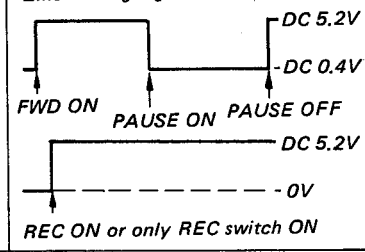
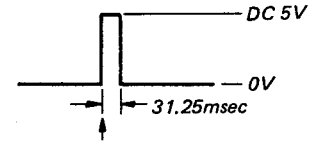
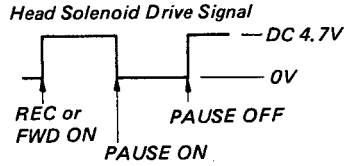
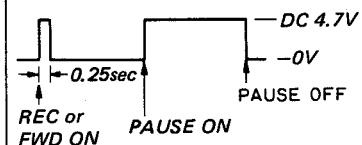
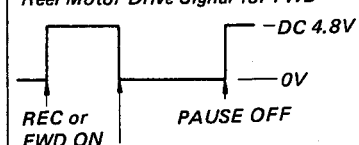
Pin No.	Waveform or Voltage
⑳	Bias Signal (Empty Pin) 
㉑	Line Muting Signal  REC ON or only REC switch ON
㉒	R.P.P. Signal (Empty Pin)  PAUSE switch ON in REC
㉓	Head Solenoid Drive Signal  STOP: DC 0V
㉔	AMS Solenoid Drive Signal  STOP: DC 0V
㉕	Reel Motor Drive Signal for FWD  STOP: DC 0V FF: DC 0.3V
㉖	Reel Motor Drive Signal for FF FF: DC 4.8V REC, FWD: DC 0.3V STOP, PAUSE: DC 0V
㉗	Reel Motor Drive Signal for REW REW: DC 4.8V STOP: DC 0V
㉘	B+ Power Voltage DC 5.2V

Table 13

19. Relation between Mechanical and Electrical Operation

The following explanation uses FWD operation as an example (See Fig. 60)
IC703 (11) goes low and IC718 (2), (23), (25) go high because of the microcomputer.
IC703 (11) low turns off Q743, turns on Q714, 715, 713 and supplies high voltage for turning on the solenoids.

IC718

(2) H → Turns on Q710 and brake solenoid, moving brake plate away from reel table.

(23) H → Turns on Q709 and head base solenoid, pushing the head base out. When Q709 goes on, Q742, 774 go off, stopping high voltage supply to the brake solenoid. After that, supplies +B from Q785.

(25) H → Turns on Q708, lowers Q707 base voltage and lowers voltage being supplied to the reel motor from the emitter. (lowers number of reel motor rotations)
Q706 goes on at the same time, turning reel motor in FWD (FF) direction.

When changing to FF or REW from FWD mode, etc., without going through STOP, the brake solenoid remains on. When the brake solenoid is on, the head board pin touches the brake lever, as shown in Fig. 34 (A), and the head board is prevented from returning to its original position.
To prevent this, when the head base solenoid turns off, Q701 also goes off. When this happens, Q775 goes on momentarily via R22, C758, turning off Q710 and the brake solenoid. Next the brake solenoid is turned on again and FF or REW mode results.

FWD/REC operation

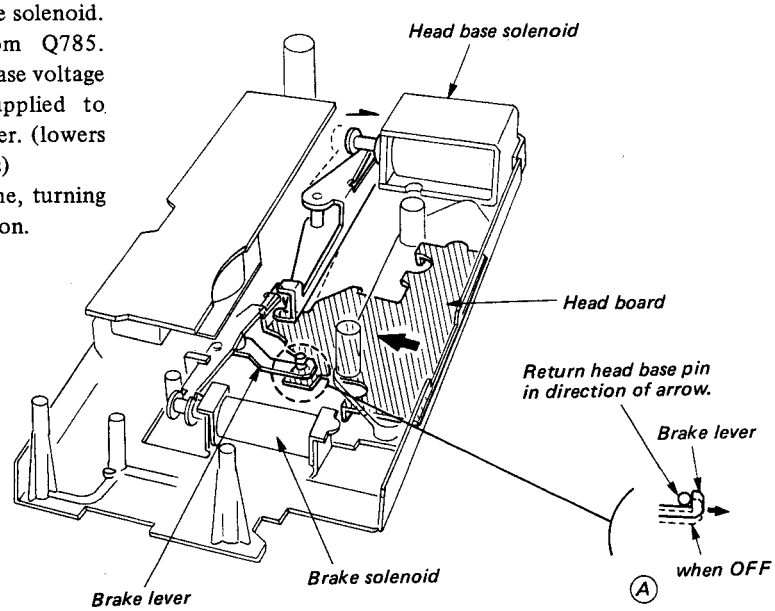


Fig. 60

FF, REW operation

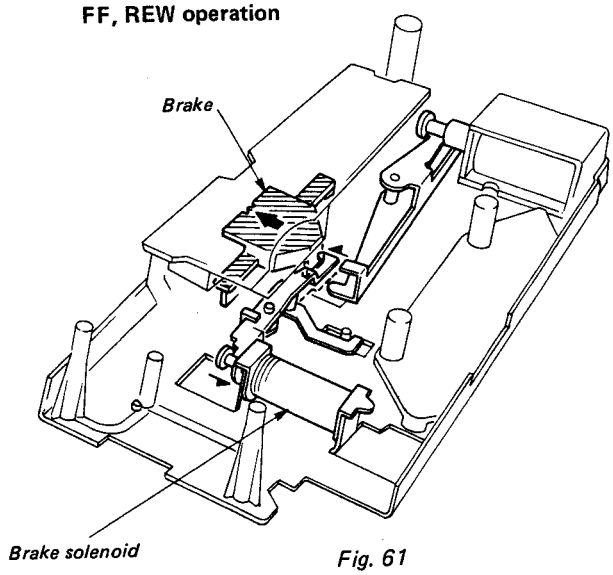


Fig. 61

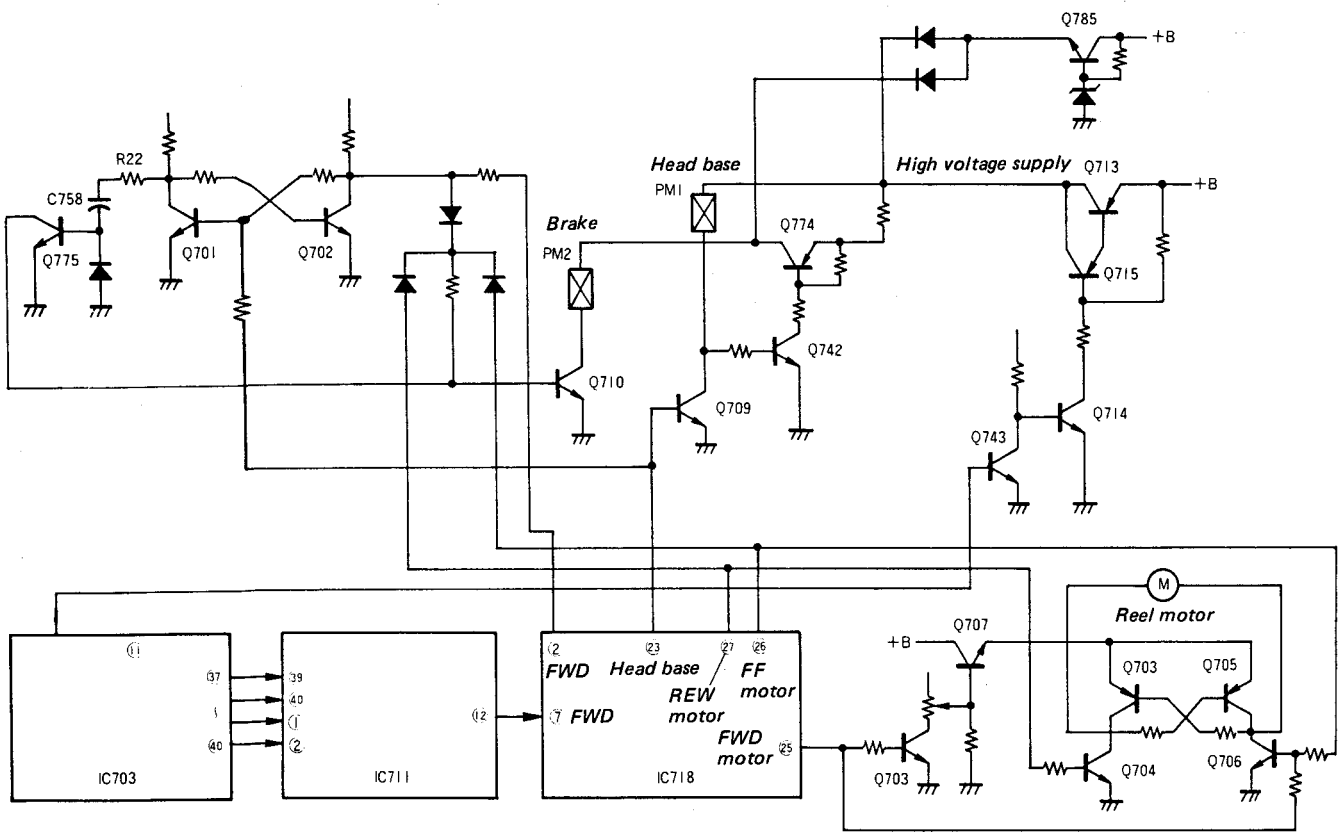

Q785
+B
R22
C758
Q775
Q701
Q702
Head base
PM1
High voltage supply
Q713
+B
Brake
PM2
Q774
Q715
Q742
Q710
Q709
Q714
Q743
M
Reel motor
Q707
+B
Q703
Q705
IC703
IC711
IC718
FWD
Head base
REW motor
FF motor
FWD
FWD motor
Q703
Q704
Q706

Fig. 62